

Refrigeration Service Engineer

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to Chicago*



6th Annual R.S.E.S. Convention
and All-Industry Refrigeration
and Air Conditioning Exhibit



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VOLUME INDEX

January to December, 1939

Volume Seven

TO facilitate the location of articles which have appeared in THE REFRIGERATION SERVICE ENGINEER, this index is a regular feature in each December issue, serving as a ready reference of the articles and subject matter which have appeared in the preceding twelve issues.

The figure following the date of issue refers to the page on which the article will be found.

A	
Accident Prevention and First Aid in Refrigeration Service, <i>By V. C. Kelsey</i>	Jan.—17; Feb.—16
Adjusting an Air Conditioning Job.....	Mar.—35
Aid to Refrigeration, Rentschlerizing, <i>By T. R. Porter</i>	June—11
Air Conditioned Buses Placed in Service, <i>New Unit</i>	Feb.—27
Air Conditioning and Refrigeration Equipment, Maintenance of, <i>By H. R. Jaeggli</i>	Mar.—11
Glycerine Valuable Aid in.....	June—13
Installations, How to Tune Up, <i>By Floyd M. Mayse</i>	Oct.—17
Simplified, <i>By George G. Borden</i>	Apr.—11; May—17; June—25; July—24; Aug.—23; Sept.—23; Nov.—21; Dec.—27
System, Reverse Cycle.....	Mar.—36
All-Industry Exhibition Introduces 1939 Lines.....	Feb.—30
Analyzer, Building a Refrigeration, <i>By Edu. N. Avery</i> , Feb.—11; Mar.—14; Apr.—15	
Apparatus, Testing, for Shops, <i>By L. K. Wright</i>	May—25
Applicators, Convenient.....	June—23
B	
Bakery, Refrigeration in a Chicago.....	June—32
Beer Dispensing Business, Refrigeration Service Opportunities in the, <i>By C. D. McLaughlin, M. E.</i>	Jan.—26
Bonding and Licensing Regulations in Wisconsin.....	Sept.—29
Bottle Cooler Agitator.....	Nov.—28
Brass, Cleaning.....	May—16
Brittle Copper Tubing.....	Sept.—31
Building a Charging and Testing Board, <i>By R. E. Meeker</i>	Apr.—26
a Refrigeration Analyzer, <i>By Edward N. Avery</i>	Feb.—11; Mar.—14; Apr.—15
Bunsen Burner to Heat Evaporators.....	Oct.—29
Buses, New Air Conditioned, Placed in Service.....	Feb.—27
C	
Calorimeter, A Portable, <i>By D. D. Wile</i>	Sept.—11
A Simple.....	Oct.—25
Capacitor-Start Motors, Servicing, <i>By Paul McKnight Deeley</i>	Dec.—31
Capacitor Starter.....	Aug.—31
Tester, <i>By J. P. Iseman, Jr.</i>	May—24
Capacitors, Motor, <i>By Louis Kahn</i>	July—21
Capacity Booster Valve, <i>By George H. Clark</i>	Sept.—26
Capillary and High Side Float, A Comparison of the.....	Aug.—20
Chargers, Rapid Drum.....	Nov.—27
Charging and Testing Board, Building a, <i>By R. E. Meeker</i>	Apr.—26
Charging Board, A Small Drum.....	Apr.—14
Chemical and Mechanical Aspect of Locker Storage Plants, <i>By Martin G. Lane</i>	Oct.—11; Nov.—15; Dec.—35
Cleaning Brass.....	May—16
Coils.....	Nov.—28
Files.....	Jan.—25
Metal Surfaces.....	Mar.—17
Receivers, <i>By L. K. Wright</i>	July—17
Solution.....	Oct.—28
Combination Wrench.....	June—31
Commercial Evaporators, Low Temperature, Defrosting, <i>By E. N. Avery</i>	July—11
Comparison of the Capillary Tube and High Side Float.....	Aug.—20
Compressor, Dicler Radial.....	Aug.—26
The Spartan.....	Oct.—23
Constructing Insulated Milk Tanks.....	Aug.—11
Refrigerated Rooms, <i>By Willis M. Rees</i>	May—21
Construction and Operation of the Ice-O-Matic of the Westinghouse Unit.....	Nov.—11
Contest Closed, Tool and Service Kink.....	Jan.—25
Control, New, for the Commercial Field, Sept.—17	
Household Refrigerator, <i>By G. E. Graff</i> , May—34	
Convenient Applicators.....	June—23
Coolers, Fans in.....	July—30
Copper Tubing, Brittle.....	Sept.—31
D	
Defrosting Low Temperature Commercial Evaporators, <i>By E. N. Avery</i>	July—11
Dehydrating Unit.....	Aug.—34
Detroit Lubricator Visits the Pacific Coast.....	Apr.—36
Dicler Radial Compressor.....	Aug.—26
Duco Finishes, the Repair of.....	Sept.—20
E	
Electric Motor Lug.....	Oct.—30
Electric Motor of Tomorrow Fiberglass Insulated.....	Oct.—21
Electric Testing Block.....	Oct.—29
Electricmatic, New Section Throttling Valve, <i>By Hal Weir McPherson, E. E.</i>	Jan.—39
Evaporators, Defrosting Low Temperature Commercial, <i>By E. N. Avery</i>	July—11
Expansion Valve, Making a Handy Adjusting Tool for, <i>By L. K. Wright</i>	Jan.—24
Extractor, Motor Bearing.....	July—28
F	
Fans in Coolers.....	July—30
Fiberglass Insulated, Electric Motor of Tomorrow.....	Oct.—21
Field and Shop Data on General Electric Refrigerators, Jan.—11; Feb.—20; Mar.—18	
Files, Cleaning.....	Jan.—25
Finishes, Duco, The Repair of.....	Sept.—20
First Aid and Accident Prevention in Refrigeration Service, <i>By V. C. Kelsey</i>	Jan.—17; Feb.—16
First All-Industry Exhibition Introduces 1939 Lines.....	Feb.—30
Flash Gas, <i>By A. F. Hoesel</i>	Nov.—19
Flash Light Accessory.....	Nov.—30
Foodstuffs, Refrigerated Trucks Save Perishable.....	May—19
Freon and Methyl Chloride, How to Distinguish Between.....	Oct.—30
Frigidaire Hermetic Unit.....	June—14
Frost-Back, Protecting the Compressor from.....	Oct.—30
G	
Gas, Flash, <i>By A. F. Hoesel</i>	Nov.—19
General Electric Refrigerators, Field and Shop Data on.....	Jan.—11; Feb.—20; Mar.—18
Generation in Refrigeration Service, <i>By A. E. Hulbert</i>	June—42
Generator Tube, New Steam.....	June—26
Glycerine Valuable Aid in Air Conditioning.....	June—13
Grunow Puller Attachment.....	Sept.—36

Herm
Serv
Herm
High
Hous
How
to J
to T
Ice C
Ice-O
Improv
Individ
Insulat
Kinks
Leak
Refr
Licensi
Locker
Chen
Low T
Mainte
Makin
Pipe
Manufa
Mechan
Metal S
Metals,
Methyl
Milk T
Minnea
Modur
Moistur
Motor
Extra
Motor C
New Ai
Contr
Devic
Electr
Steam
New E
Operatio
Pipe Bu
Planter
Portable
Pressur

Hermetic Frigidaire	June—14
Serve!	Aug.—15
Hermetically-Sealed Units, Servicing, <i>By S. R. Thompson</i>	Jan.—21
High Side Float, A Comparison of the Capillary Tube and	Aug.—20
Household Refrigerator Controls, <i>By G. E. Graff</i>	May—34
How Many Valves for Economy? <i>By H. E. Farrill</i>	Dec.—24
to Distinguish Between Methyl and Freon (F12)	Oct.—30
to Tune Up Air Conditioning Installations, <i>By Floyd M. Mayse</i>	Oct.—17

Ice Cream Cabinets, Servicing, <i>By Everett J. Newcomer</i>	June—27
Ice-O-Matic Unit, Construction and Operation of	Dec.—17
Improvements and New Devices Introduced at Exhibition	Feb.—31
Individual Home Locker Storage Plant	Oct.—20
Insulated Milk Tanks, Constructing	Aug.—11

Kinks That Jack Built	July—28
-----------------------------	---------

Leak Detector	Aug.—31
Refrigerant	June—31
Licensing and Bonding Regulations in Wisconsin	Sept.—29
Locker Storage Plant, Individual Home	Oct.—20
Chemical and Mechanical Aspect of, <i>By Martin G. Lane</i>	Oct.—11; Nov.—15; Dec.—35
Low Temperature Commercial Evaporators, Defrosting, <i>By E. N. Avery</i>	July—11

Maintenance of Refrigeration and Air Conditioning Equipment, <i>By H. R. Jaeggli</i>	Mar.—11
Making a Handy Expansion Valve Adjusting Tool, <i>By L. K. Wright</i>	Jan.—24
Pipe Bushings Out of Standard Pipe	Jan.—25
Manufacturers Discuss Problems at Spring Meeting	May—39
Mechanical and Chemical Aspect of Locker Storage Plants, <i>By Martin G. Lane</i>	Oct.—11; Nov.—15; Dec.—35
Metal Surfaces, Cleaning of	Mar.—17
Metals, to Remove Rust from	June—31
Methyl Chloride and Freon, How to Distinguish Between	Oct.—30
Milk Tanks, Insulated, Constructing	Aug.—11
Minneapolis-Honeywell Modutron Control	Dec.—40
Modutron Control, Minneapolis-Honeywell	Dec.—40
Moisture in Refrigerating Systems, <i>By E. W. McGovern</i>	Mar.—23; Apr.—18
Motor Bearing Drift	Sept.—36
Extractor	July—28
Motor Capacitors, <i>By Louis Kahn</i>	July—21

New Air Conditioned Buses Placed in Service	Feb.—27
Control for the Commercial Field	Sept.—17
Devices and Improvements Introduced at Exhibition	Feb.—31
Electrification Section Throttling Valve, <i>By Hal Weir McPherson, E. E.</i>	Jan.—39
Steam Generator Tube	June—26
New England Jobbers Sponsor Refrigeration Exhibit	Apr.—38

Operation and Construction of the Westinghouse Unit	Nov.—11
---	---------

Pipe Bushings, Making Out of Standard Pipe	Jan.—25
Plaster Paris	Apr.—35
Portable Calorimeter, <i>By D. D. Wile</i>	Sept.—11
Pressure Test Unit	Aug.—29

Protecting the Compressor from Frost-Back	Oct.—30
---	---------

Question Box	Jan.—35; Feb.—28; Mar.—34; Apr.—31; May—30; June—33; July—34; Aug.—36; Sept.—37; Oct.—31; Nov.—31; Dec.—76
Adjusting an Air Conditioning Job	Mar.—35
Answer to Question Contained on Page 25	Jan.—35
Apex Refrigerator	July—36
Assembling Joints	Nov.—35
Beer Cooling	Oct.—41
Building an Oven	Nov.—31
Calculating Fin Evaporators	Jan.—35
Capillary Tube Systems	May—31
Capillary Tubes	Oct.—38
Cleaning Aluminum Trays	Aug.—36
Receivers	July—40
Cold Weather Troubles	Sept.—41
Coldspot Troubles	Nov.—36
Comments on Previous Questions	June—33; July—34
on Questions 235 and 294	Mar.—34
on Question 299	July—30
on Question 330	Oct.—31
Crosley Beverage Cooler	Aug.—44
Display Case Trouble	Jan.—36
Display Cases	Aug.—42
Drying Compressors	July—40
Estimating Load on Display Cases	June—34
Eutectic Solutions	Jan.—35
Expansion Valve Oversize	Oct.—31
Gasoline Powered Refrigerator	Sept.—40
General Electric and Kelvinator Problems	July—37
Graybar Refrigerator	July—38
Hermetic Units	Apr.—31
Hot Gas Defrosting	May—30
How Does Shortage of Gas Affect Expansion Valve?	June—40
How Much Oil—Checking Head Pressures—Ambient Temperatures	Aug.—40
Humidity in the Average Refrigerator	June—35
Ice Cream Cabinet Leaks	Sept.—38
Ice in the System	July—40
Ig Refrigerator	Sept.—37
Kelvinator High Side Float	June—40
Lipman Model 81	May—33
Locating Leaks	Aug.—38
Milk Cooling	Oct.—34
Miscellaneous Questions	Feb.—28; Dec.—78
Moisture in Freon Jobs	Apr.—35
Moving Crosley to Basement	Nov.—31
Multiple Installation	Nov.—31
Oily Mass Clogging Valve	Nov.—34
Recharging Control Bellows	Aug.—36
Reclaiming Refrigerants	Aug.—45
Refrigerant Dryers	Apr.—34
Xylene in Hermetics	Jan.—35
Refrigerating a Display Window	Sept.—37
an Ice House	Nov.—35
Refrigerator Gets Hot	Dec.—77
Relief for Hay Fever Cases	Sept.—42
Result of Mixing Gases	July—36
Schaefer Malted Milk Machine	Mar.—34
Shutting Off a System for the Winter	June—40
Soda Fountain Trouble	Dec.—76
Soldering Evaporators	July—39
Steel Evaporators	Aug.—43
Sticky Compressors	Oct.—40
Storing Horse Meat	Oct.—36
Suggestions on Question 294	Feb.—28
Superior Refrigerator	May—32
Trouble with Valves Freezing	July—34
Two-Temperature Work	Dec.—80
Unbalanced System	Nov.—34
Unit Cooler Troubles	May—31
Westinghouse Refrigerator	May—32
What Length Capillary Tube?	May—33
What Size Thermal Cutout?	June—40

Radial Compressor, Dieler	Aug.—26
Random Suggestions, <i>By W. Hall Moss</i>	June—50
Rapid Drum Chargers	Nov.—27
Receivers, Cleaning, <i>By L. K. Wright</i>	July—17
Recording Pressure Gauge	June—30

Refrigerant Leak Detector.....	June—31
Refrigerated Rooms, Constructing, By Willis M. Rees.....	May—21
Trucks Save Perishable Foodstuffs.....	May—19
Refrigerating Shasta Dam, By John Schlemmer.....	July—20
Systems, Moisture in, By E. W. McGovern.....	Mar.—23; Apr.—18
Refrigeration Analyzer, Building a, By Edw. N. Avery.....	Feb.—11; Mar.—14; Apr.—15
and Air Conditioning Equipment, Maintenance of, By H. R. Jaeggli.....	Mar.—11
in a Chicago Bakery.....	June—32
Rentschlerizing, an Aid to, By T. R. Porter.....	June—11
Service, A Generation in, By A. E. Hulbert.....	June—42
Service, Accident Prevention and First Aid in, By V. C. Kelsey.....	Jan.—17; Feb.—16
Service Opportunities in the Beer Dispensing Business, By C. D. McLaughlin, M. E.....	Jan.—26
Refrigeration Equipment Manufacturers Association Holds Fall Meeting.....	Nov.—26
Refrigeration Service Engineers Society Dept.....	Jan.—42; Feb.—38; Mar.—37; Apr.—40; May—42; June—54; July—42; Aug.—48; Sept.—44; Oct.—44; Nov.—38; Dec.—44
A Request from Our Educational Director.....	Mar.—37
Additional Convention Committees Appointed.....	Nov.—44
Akron Chapter.....	Apr.—44; July—49
All-Industry Refrigeration and Air Conditioning Exposition.....	Jan.—42
Amendment to National Constitution and By-Laws.....	Oct.—51
Boston Chapter.....	Apr.—45; June—58; Sept.—51; Oct.—52; Nov.—51
Capital City Chapter.....	Feb.—49; July—50
Central Arizona Chapter.....	Sept.—50
Receives Charter.....	Apr.—40
Central Indiana Chapter.....	Feb.—47; Mar.—49; Apr.—46; May—54; July—52; Oct.—51; Nov.—44
Central New York Chapter.....	Jan.—52; Mar.—43; Apr.—50
Chapter Notes.....	Jan.—48; Feb.—44; Mar.—42; Apr.—42; May—53; June—57; July—46; Aug.—50; Sept.—50; Oct.—51; Nov.—45; Dec.—65
Chicago Chapter.....	Jan.—49; Feb.—46
Chickasaw Chapter.....	Feb.—53; June—62
Cleveland Chapter.....	Feb.—53; June—62
Controversy in Central New York Chapter.....	Apr.—50
Convention Committee Announced.....	Oct.—49
Plans.....	Dec.—44, 56
Dayton Chapter.....	Jan.—53; Feb.—52; Mar.—47; Apr.—46; June—58; July—50; Aug.—50; Sept.—50; Oct.—55; Nov.—47
Des Moines Chapter.....	Feb.—42
Fire Destroys Stock of Neon Elec. & Radio Co.....	Dec.—62
First Annual Winter Meeting of Illinois State Association.....	Feb.—38
Goldberg's, Herman, Annual Christmas Party.....	Dec.—60
Illinois State Assn. to Hold Convention Nov. 4-5.....	Sept.—48; Oct.—50
Holds Second Annual Meeting.....	Nov.—40; Dec.—56
Illinois Valley Chapter.....	Nov.—45
Indianapolis Chapter.....	Jan.—50; Mar.—51
International Meeting at Hamilton, Ontario.....	Dec.—62
It's Chicago—In January.....	Oct.—47
Kansas City Auxiliary.....	June—63; July—53; Oct.—56; Nov.—53; Dec.—75
Kansas City Chapter.....	Feb.—52; Mar.—51; Apr.—48; May—58; July—51; Oct.—53; Nov.—45
Annual Banquet.....	Mar.—37
Ladies' National Auxiliary.....	Apr.—49
Larson, Gustave A., U. S. A.....	Jan.—47
Leitner, S. A., Reports on Chapter Activities.....	Nov.—44

Refrig. Serv. Eng. Soc. Cont.—	
Let's Go to Chicago.....	Sept.—44
Lincoln Chapter.....	Nov.—47
Long Beach Chapter.....	Feb.—56; May—54; June—57; July—7; Aug.—52; Sept.—51; Oct.—52; Nov.—49
Los Angeles Chapter.....	Feb.—50; Mar.—38; Apr.—46; June—55 & 69; July—46; Oct.—55; Nov.—49
Madison Chapter.....	Feb.—47; Apr.—48; May—55; Aug.—52
Michiana Chapter.....	Nov.—51
Receives Charter.....	May—51
Mile High Chapter.....	Feb.—49; May—48; July—47; Aug.—54; Nov.—50
Bowling Team.....	July—44
Mississippi Valley Chapter.....	Jan.—51; Feb.—44; Mar.—50; Apr.—44; May—56; June—59; July—48; Sept.—51; Nov.—46
Annual Banquet.....	Mar.—38
Missouri Valley Chapter.....	Jan.—50; Feb.—50; Mar.—42; Apr.—45; May—57; Aug.—51
Mohawk Valley Chapter.....	Feb.—49
Montgomery Chapter.....	May—56; June—48; Aug.—54; Oct.—55; Nov.—51
Monumental Chapter.....	June—69; Aug.—53; Nov.—51
Mount Royal Chapter.....	Nov.—48
New Chapters Formed.....	Feb.—39; May—46; Nov.—39; Dec.—58
New Officers Elected for Des Moines Chapter.....	Feb.—42
Newly-Elected Officers of Pittsburgh Chapter.....	Feb.—40
Niagara Frontier Chapter.....	Feb.—55
On to Chicago, 6th Annual R.S.E.S. Convention.....	July—42; Aug.—50; Nov.—38
Ontario Forest City Chapter.....	Feb.—55
Ontario Maple Leaf Chapter.....	Sept.—52
Pittsburgh Chapter.....	Jan.—52; Feb.—40 & 54; Mar.—46; Apr.—47; May—53; June—57; July—47; Sept.—53; Oct.—54; Nov.—49
Ladies' Auxiliary.....	Feb.—58; Apr.—50
Plan to Attend R.S.E.S. Convention.....	June—54
Pony Express Chapter.....	Feb.—46
Rockford Chapter.....	Feb.—46; Mar.—47; Apr.—47; May—57; June—61; July—49; Nov.—47
Ladies' Auxiliary.....	May—52; Sept.—49
St. Louis Chapter.....	Jan.—53; Feb.—51; Mar.—49; Apr.—43; May—58; June—61; July—48
San Diego Chapter.....	Mar.—48
Picnic.....	July—44
Scranton Chapter.....	Apr.—43; July—48
Second Annual Picnic of Springfield Chapter.....	Sept.—48
6th R.S.E.S. Convention to Be Held in Chicago, January 15-18, 1940.....	May—44
Springfield Chapter.....	Feb.—45; Mar.—44; Apr.—44; Sept.—48
Dinner Party.....	Mar.—40
Ten Ways to Kill an Organization.....	Jan.—47
Toledo Chapter.....	Jan.—51; Feb.—56; Mar.—44; Apr.—43; May—59
Tri-County Chapter.....	Mar.—48; Apr.—43; July—52; Nov.—52
Picnic.....	Nov.—42
Tri-State Chapter.....	Jan.—51; Feb.—50; Mar.—44; Nov.—50
and Ladies' Auxiliary Christmas Party.....	Feb.—58
Fish Fry.....	May—52
Ladies' Auxiliary.....	Jan.—54; Feb.—58; June—56; Aug.—55; Oct.—56; Nov.—52; Dec.—75
Twin Cities Chapter.....	Feb.—54; Apr.—43; May—53; June—57; July—46; Aug.—50; Sept.—50; Oct.—53; Nov.—48
Vox Pop Contest Makes Interesting Meeting for Los Angeles Chapter.....	Mar.—38
Western Massachusetts Chapter.....	Apr.—48
Wichita Chapter.....	Jan.—54; Feb.—53; Mar.—45; Apr.—42; May—54; June—58; Oct.—56
Wisconsin State Assn. to Hold Annual Picnic.....	Sept.—47; Dec.—64

Year Book Near Completion.....	May-48
Refrigerator Controls, Household, <i>By G. E. Graff</i>	May-34
Regulations, Licensing and Bonding in Wisconsin.....	Sept.-29
Relative Humidity, Here is a Tricky Question.....	Jan.-25
Rentschlerizing, an Aid to Refrigeration, <i>By T. R. Porter</i>	June-11
Repair of Duco Finishes.....	Sept.-20
Reverse Cycle Air Conditioning System.....	Mar.-36
Rooms, Constructing Refrigerated, <i>By Willis M. Rees</i>	May-21
Rust, to Remove from Metals.....	June-31

S

Sales, The Service Engineer in, <i>By Bob Tyler</i>	May-13
Salesmanship in Service Work, <i>By E. P. Sorenson</i>	Apr.-24
Seal Holding Tool.....	Nov.-29
Testing Tube.....	July-28
Servel Hermetic Unit.....	Aug.-15
Service Engineer in Sales, <i>By Bob Tyler</i>	May-13
Service Kink and Tool Contest Closed.....	Jan.-25
Winners of the.....	Mar.-36
Service Kink "Kinked".....	July-27
Service Kinks.....	Jan.-25; Mar.-36; Apr.-26; May-24; June-30; July-27; Aug.-29; Sept.-34; Oct.-29; Nov.-28; Dec.-42
Bottle Cooler Agitator.....	Nov.-28
Building a Charging and Testing Board, <i>By R. E. Meeker</i>	Apr.-26
Bunsen Burner to Heat Evaporators.....	Oct.-29
Capacitor Starter.....	Aug.-31
Tester, <i>By J. P. Iseman, Jr.</i>	May-24
Cleaning Coils.....	Nov.-28
Combination Wrench.....	June-31
Dehydrating Unit.....	Aug.-34
Electric Motor Lug.....	Oct.-30
Testing Block.....	Oct.-29
Flash Light Accessory.....	Nov.-30
Freeing Stuck Compressors.....	Nov.-29
Grunow Puller Attachment.....	Sept.-36
Handle for Prest-O-Lite Tank.....	Dec.-42
High-Low Temperature Alarm.....	Dec.-42
How to Distinguish Between Methyl and Ercen (F12).....	Oct.-30
Kinks That Jack Built.....	July-28
Leak Detector.....	Aug.-31
Motor Bearing Drift.....	Sept.-36
Motor Bearing Extractor.....	July-28
Pressure Test Unit.....	Aug.-29
Protecting the Compressor from Frost-Back.....	Oct.-30
Recording Pressure Gauge.....	June-30
Refrigerant Leak Detector.....	June-31
Seal Holding Tool.....	Nov.-29
Seal Testing Tube.....	July-28
Service Kink "Kinked".....	July-27
Service Analyzer.....	Dec.-43
Methods of an Old-Timer.....	Sept.-34
Shaft Turning Tool.....	Nov.-29
Small Parts Motors.....	Oct.-30
Spring Winding Jig.....	Sept.-36
Suction Cup Tester for Valves.....	Oct.-29
Testing Apparatus for Shops, <i>By L. K. Wright</i>	May-25

To Remove Rust from Metals.....	June-31
Using Carbon Tetrachloride.....	Dec.-43
Valve Plate Tester.....	July-29
Wheel and Gear Puller.....	Nov.-30
Service Opportunities, Refrigeration, in the Beer Dispensing Business, <i>By C. D. McLaughlin, M. E.</i>	Jan.-26
Work, Salesmanship in, <i>By E. P. Sorenson</i>	Apr.-24
Servicing Capacitor-Start Motors, <i>By Paul McKnight Decley</i>	Dec.-31
Hermetically-Sealed Units, <i>By S. R. Thompson</i>	Jan.-21
Ice Cream Cabinets, <i>By Everett J. Newcomer</i>	June-27
Shaft Turning Tool.....	Nov.-29
Shop and Field Data on General Electric Refrigerators, Jan.-11; Feb.-20; Mar.-18	
Shops, Testing Apparatus for, <i>By L. K. Wright</i>	May-25
Simple Calorimeter.....	Oct.-25
Simplified Air Conditioning, <i>By George G. Borden</i>	Apr.-11; May-17; June-25; July-24; Aug.-23; Sept.-23; Nov.-21; Dec.-27
Sixth R.S.E.S. Convention to Be Held in Chicago—January 15-18, 1940.....	May-44
Small Drum Charging Board.....	Apr.-14
Small Parts Motors.....	Oct.-30
Sparton Compressor.....	Oct.-23
Spring Winding Jig.....	Sept.-36
Steam Generator Tube, New.....	June-26
Suction Cup Tester for Valves.....	Oct.-29
Throttling Valve, The New Electromatic, <i>By Hal Weir McPherson, E. E.</i>	Jan.-39
Superheat, What? <i>By Geo. H. Clark</i>	Mar.-28

T

Tanks, Insulated Milk, Constructing.....	Aug.-11
Ten Ways to Kill an Organization.....	Jan.-47
Testing and Charging Board, Building a, <i>By R. E. Meeker</i>	Apr.-26
Apparatus for Shops, <i>By L. K. Wright</i>	May-25
Block Electric.....	Oct.-29
Thermometers.....	June-23
Thermometers, Testing.....	June-23
To Remove Rust from Metals.....	June-31
Tools, A Word About, <i>By H. D. Busby</i>	Nov.-24
Trucks, Refrigerated, Save Perishable Food-stuffs.....	May-19
Tube, New Steam Generator.....	June-26
Tubing, Brittle Copper.....	Sept.-31

V

Valve Plate Tester.....	July-29
Valve, The Capacity Booster, <i>By George H. Clark</i>	Sept.-26
Valves for Economy, How Many? <i>By H. E. Farrill</i>	Dec.-24

W

Westinghouse Refrigerator.....	May-32
Unit, Construction and Operation of the.....	Nov.-11
What Superheat? <i>By Geo. H. Clark</i>	Mar.-28
Wheel and Gear Puller.....	Nov.-30
Winners of the Service Kink Contest.....	Mar.-36
Word About Tools, <i>By H. D. Busby</i>	Nov.-24
Wrench, Combination.....	June-31

INDEX OF ILLUSTRATIONS

A

Air Conditioner, New Ten-Ton.....	Apr.-51
Air Conditioning Control Board.....	July-57
Installation, Views of.....	Oct.-18
All-Industry Convention Exhibits Committee.....	May-40
Convention Views.....	Feb.-37
Analyzer, Refrigeration.....	Apr.-16
Arizona Chapter Charter Presentation.....	Apr.-41

C

California Refrigerator Company, "Sandy" Pratt's.....	Sept.-56
---	----------

Calorimeter.....	Oct.-26
Portable.....	Sept.-12
Capacity Booster Valve.....	Sept.-27
Carrying Case, New.....	Apr.-52
Complete Refrigeration Sales & Service Co. Bldg.....	Sept.-55
Cornell-Dubilier "Service Mike".....	Dec.-33
"Test Mike".....	Dec.-33
Cycle of Operation Ice-O-Matic Unit.....	Dec.-20

D

Des Moines Chapter Members.....	Feb.-43
Detailed Section of Ice-O-Matic Model AA.....	Dec.-18
Model X.....	Dec.-22
Diceler Radial Compressor.....	Aug.-27

E	
"Electric Motor of Tomorrow" Exhibit.....	Oct.—22
Expansion Valve Adjusting Tool.....	Jan.—24

F	
Floor Plan of Exhibit Space.....	Dec.—50
of Locker Plants.....	Dec.—35, 36
Frigidaire Hermetic Unit.....	June—14

G	
General Electric Unit.....	Jan.—13; Feb.—21; Mar.—19
General Refrigeration-Lipman Air Conditioner.....	Aug.—58
Gilmer Belt Merchandiser.....	Oct.—57

H	
Head-Back Pressure Calculator.....	Oct.—58
Home Storage Locker.....	Oct.—20
Horak Organization Members.....	Feb.—57

I	
Illinois State Association Banquet.....	Nov.—40

J	
Jarrow Gaskets, New.....	Oct.—59
Justrite Soldering Set.....	Dec.—89

K	
Kansas City Chapter Annual Banquet.....	Mar.—37
Ladies' Auxiliary Dinner Dance and Card Party.....	June—64
Kerotest Valves.....	Dec.—25

L	
Leak Detector.....	Sept.—57
Locked Rotor Torque Measurement.....	Dec.—32
Locker Room In a Frozen Foods Plant.....	Oct.—12
Storage Plant Piping Arrangement.....	Nov.—17
Los Angeles Chapter Members.....	Mar.—38; Apr. 36
Tube Bending Contest.....	June—56
Lowry Process Coil Cleaning Machine.....	Nov.—54

M	
Manifolds, Copper Tube Sold "In Bulk".....	Apr.—52
New Imperial.....	Apr.—53
Manufacturers Fin Coil Co. Catalog.....	Apr.—54
Marsh Serviceman Recorder.....	Feb.—35
Mason City Refrigeration Co. Shop and Transportation Equipment.....	Jan.—46
Mercury Switch, New Metal.....	Nov.—57
Metal Bins for Small Parts.....	Jan.—59
Method of Connecting Minneapolis-Honeywell Modutron Control.....	Dec.—41
of Installing S.A.C. Conditioner.....	Dec.—29
Midwest Display Case.....	Jan.—60
Mile High Chapter Bowling Team.....	July—45
Tube Bending Contest Winners.....	May—49
Mills Condensing Unit.....	May—20
Minneapolis-Honeywell Modutron Control.....	Dec.—40
Model AA Ice-O-Matic Units.....	Dec.—17
Model X.....	Dec.—19
Motor Bearing Drift.....	Sept.—36
Capacitor Test Set in Use, Views of.....	July—22

N	
New Zealand Refrigeration Installation.....	Sept.—54

P	
Path of Air Through S.A.C. Conditioner.....	Dec.—30
Peerless of America, Inc. Factory.....	Apr.—57
Pittsburgh Chapter Officers.....	Feb.—40
Portraits:	
Alter, Irving.....	Dec.—85
Anderson, C. S.....	May—60
Avery, E. N.....	Feb.—11; July—11
Belsky, Chas.....	May—60
Black, E. V.....	Dec.—46
Brunton, C. A.....	Nov.—40; Dec.—45
Brunton, Richard.....	June—55
Burns, G. A.....	Dec.—45
Buschkopf, C.....	Dec.—45
Clark, G. H.....	Dec.—46
Crisler, A. B.....	May—59

Darby, R. L.....	Dec.—45
Davis, A. J.....	Dec.—92
Eich, C. P.....	Dec.—45
Forbes, J. S.....	Nov.—26
Goldberg, Herman.....	May—50; Dec.—60
Hunyady, Elmer.....	June—31
Jennison, N. E.....	May—60
Jernberg, F. E.....	July—55
Josephson, J.....	July—28
Keefe, W. D.....	July—59
Kerby, E. J.....	Feb.—42
Knight, M. W.....	Dec.—54
Kramer, Ralph E.....	Oct.—61
Leitner, S. A.....	Dec.—46
Lozier, Gordon.....	May—61
McCarthy, R. C.....	Nov.—40
McDermott, H. T.....	Dec.—46
McPherrin, C. S.....	May—60
Meeker, R. E.....	Apr.—26
Milliron, A. J.....	Feb.—42
Nelson, L. C.....	Nov.—40
Oberholzer, M. R.....	May—64
Pim, Jack.....	May—59
Plesskott, E. A.....	Oct.—48; Dec.—46
Rutledge, Chesley.....	May—60
Schellenberg, A. B.....	Feb.—60
Schuster, D. B.....	Dec.—46
Seaton, E. J.....	Nov.—40
Stafford, Willis.....	Dec.—46
Terry, C. E.....	May—60
White, E. H.....	Nov.—40
Wood, B. F.....	Feb.—42

R	
Ranco 91G2 Control.....	Sept.—18
Rapid Drum Changer, Panel Board of.....	Nov.—27
Refrigeration in a Chicago Bakery.....	June—32
Refrigeration Service Company in Sacramento, Calif., Home of.....	June—65

S	
S.A.C. Conditioner.....	Dec.—28
St. Louis Tube Bending Contest.....	June—62
San Diego Chapter Annual Picnic.....	July—44
Chapter Meeting.....	Apr.—36
Servel Hermetic Unit.....	Aug.—15
Small Drum Charging Board.....	Apr.—14
Parts Holder.....	Oct.—30
Snap-On Tools Wheel Puller.....	Dec.—88
Socket Set, 38-Piece.....	Sept.—58
Soldering Iron.....	Sept.—57
South Bend Lathe Catalog.....	Nov.—59
Spartan Compressor.....	Oct.—23
Sterilamp Equipped Open Control Box.....	June—12
Stevens Hotel.....	July—43
Suction Cup Tester for Valves.....	Oct.—29
Throttling Valve, New.....	Jan.—39
Supersal Connectors.....	Dec.—86

T	
Testing the Coils Under Water.....	Feb.—36
Tri-County Chapter Picnic.....	Nov.—42
Tri-State Chapter Fish Dinner.....	Aug.—55
Truck Used in Transporting Perishable Foods.....	May—20
Tube Connector, New.....	Nov.—56

V	
Views of Illinois State Assn. Second Annual Meeting.....	Dec.—56
Wisconsin State Picnic.....	Dec.—64

W	
Westinghouse Steam Generator Tube.....	June—26
Unit.....	Nov.—11
Wheel and Gear Puller.....	Nov.—30
Windowstat Installed.....	Nov.—58
Wiring Diagram of Ice-O-Matic Unit.....	Dec.—19
Wrench, Combination.....	June—31
Nut, Double End Flare.....	June—68
Set, Double Service Boxocket.....	Feb.—36

Z	
Zero-Temp. Chest for Home Freezer Storage.....	Oct.—21



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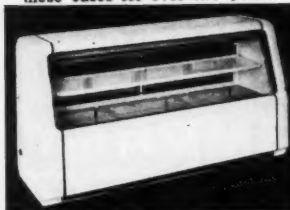
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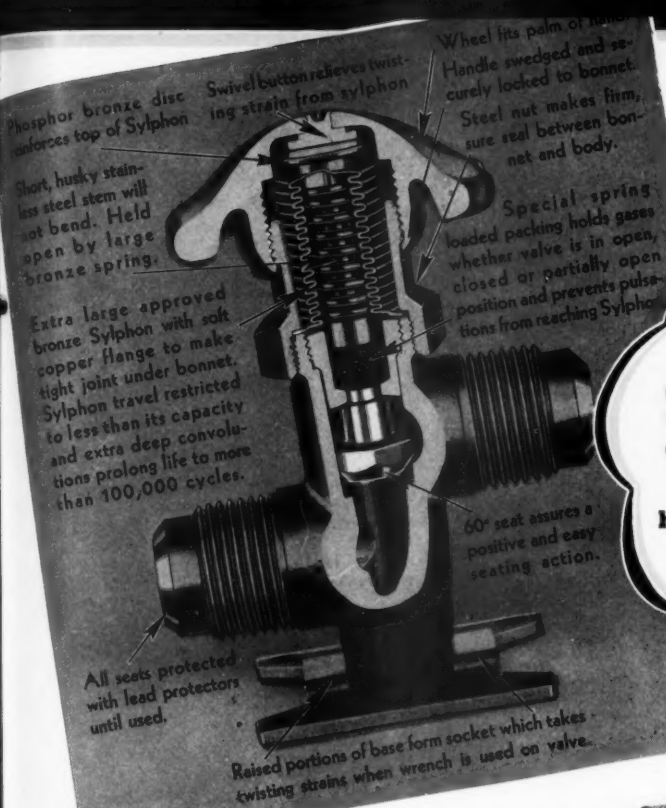


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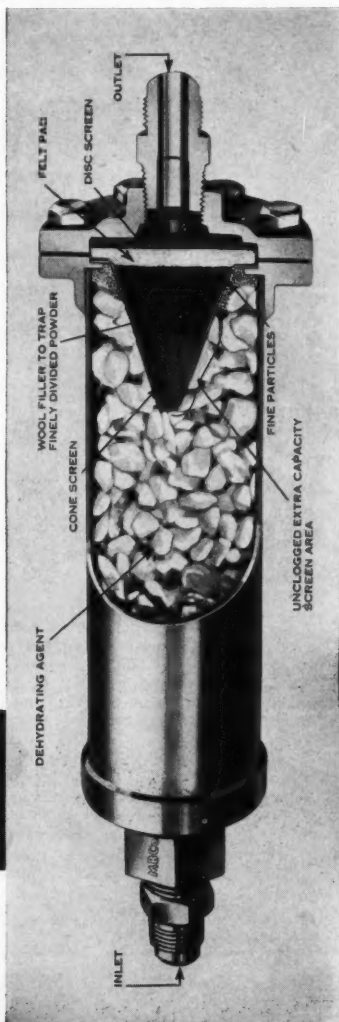
These valves are available for tube diameters from $\frac{1}{4}$ " to $\frac{3}{4}$ " for S. A. E. or solder fittings as desired. Sylphon type valves can also be furnished in sizes up to $1\frac{1}{2}$ " female I. P. T. and $1\frac{3}{8}$ " O. D. tube size.

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2	21.0	13	70.0
3	24.0	14	80.0
4	29.10	15	100.0
5	30.0	16	120.0
6	37.30	17	150.0



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3	24.0
4	29.10
5	30.0
6	37.30
7	50.0
8	70.0
9	80.0
10	100.0
11	120.0
12	150.0

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EMERGENCY CONDENSERS and MOTOR STARTING CAPACITOR INDICATOR ALL IN ONE!

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MOTOR- MIKE



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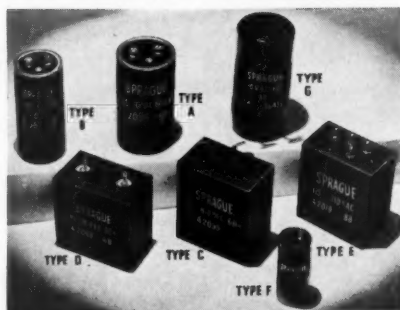
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FLYING HIGH
THEY TELL ME

VIDIS WILL
NEVER MAKE IT!

RANEY SAID
HOOVER TOLD
HIM **GRAFF**
HAS THE
TICKETS

STEP ON IT
YOU GUYS!

YOU GUYS ARE
LUCKY- I HAVE
TO TAKE MY
WIFE!

WHERE'S
DUNLOP'S
PANTS?

I TELL YOU GOLDBERG'S
GOT YOUR SOCKS AND
HOMER HID YOUR
SHIRT!

I'M BUSTED!
ASK **MEYER**-
JUST ASK HIM!

LET'S CHECK AGAIN-
BOREN
COOK
DUNBAR
LAIRD
MERKEL
SPIELMAN
HUNT
WALSH

Meet RANCO
Booths 106-107
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The Refrigeration Service Engineer

Vol. 7

No. 12

December 1939

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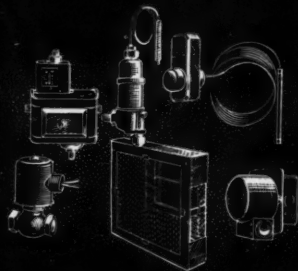
SERVICE ENGINEER

TABLE OF CONTENTS

Construction and Operation of the Ice-O-Matic Unit	17
How Many Valves for Economy? by H. E. Ferrill..	24
Simplified Air Conditioning (Eighth Article), by George G. Borden.....	27
Servicing Capacitor-Start Motors, by Paul Mc- Knight Deeley	31
The Chemical and Mechanical Aspect of Locker Storage Plants (Third Article), by Martin G. Lane	35
Minneapolis-Honeywell Modutron Control	40
Service Kinks	42
High-Low Temperature Alarm.....	42
Handle for Prest-O-Lite Tank.....	42
Service Analyzer	43
Using Carbon Tetrachloride.....	43
R.S.E.S. News	44
Heigh-Ho! Heigh-Ho! To Chicago We Must Go	44
Largest Exhibit of Refrigeration Products.....	47
Exhibitors and Where to Find Them.....	47
The All-Industry Banquet.....	54
Plans for Ladies' Entertainment.....	54
Views of the Illinois State Assn. Meeting.....	56
New Chapter in New York.....	58
Herman Goldberg's Annual Christmas Party... Fire Destroys Stock of Neon Electric and Radio Co.	60
International Meeting at Hamilton, Ontario...	62
Views of Wisconsin State Assn. Picnic.....	64
Chapter Notes	65
Auxiliary Notes	75
Question Box	76
Soda Fountain Trouble.....	76
Refrigerator Gets Hot.....	77
Miscellaneous Questions	78
Two-Temperature Work	80
News of the Industry.....	83

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The Refrigeration Service Engineer

Vol. 7, No. 12

CHICAGO, DECEMBER, 1939

\$2.00 per Annum

Construction and Operation of The Capitol Ice-O-Matic Unit

THE first Capitol Ice-O-matics produced were equipped with model AA compressors. Aside from the specification on the name plate, a model AA compressor unit can be differentiated from a model X compressor by its general appearance which is illustrated in Fig. 1. Although there is some difference in the general appearance of the exterior of the two units and a difference in the details of internal design and construction, yet the two units operate in essentially the same manner. A cross-section of the model AA compressor is shown in Fig. 2.

The model AA compressor unit is not constructed with an oil float valve nor a calcium chloride dehydrator. Consequently the cycle of the refrigerant on those units using a model AA compressor is as illustrated in Fig. 3.

No provision is made in the model AA compressor unit to separate the lubricating oil from the methyl chloride vapors and return this oil to the crank case. Any oil which may be carried over by the refrigerant into the cooling unit is returned to the compressor unit due to certain mechanical con-

struction within the cooling unit which is explained under the discussion of the cooling unit.

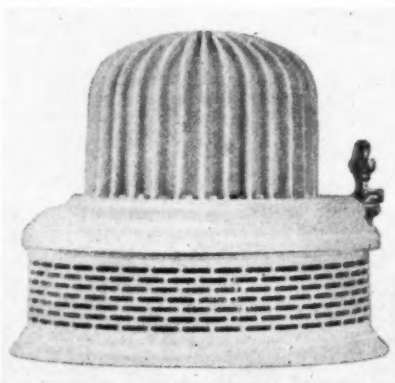
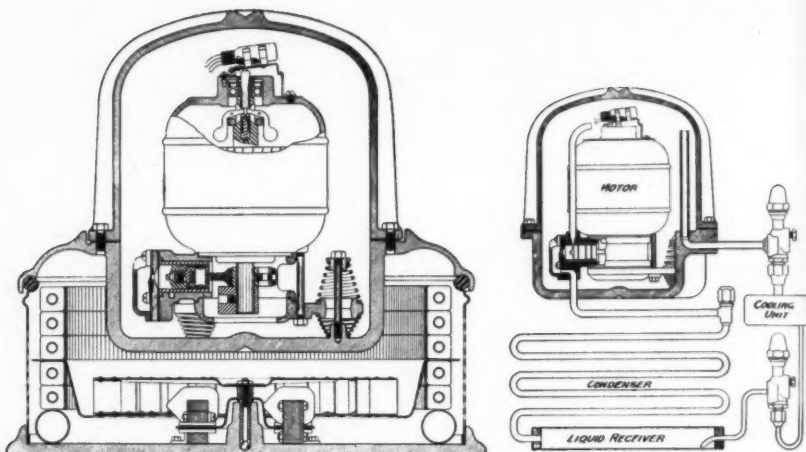


FIG. 1.—MODEL AA COMPRESSOR

The model AA compressor is constructed with a 1/6 h.p. motor. The capacity of this compressor is slightly less than that of the model X compressor due primarily to smaller



FIGS. 2 AND 3.—SHOWING DETAILED SECTION OF MODEL AA COMPRESSOR AND CYCLE OF OPERATION

cylinder bore, and less condenser surface.

The compressor unit is constructed in two sections, namely, the upper compressor section and the lower condenser section. The upper section may be lifted from the lower section in case servicing is required in that section. The dome may be removed from the crankcase to enable any repairs to be made to the motor and compressor assembly.

The control used with model AA compressor units does not have any over-load feature incorporated in its construction and consequently, there is a thermal over-load and cut-out switch installed in the rear of the compressor. This switch is wired in series with the thermostat control and breaks the circuit in case of excessive amperage.

Control

The model R-10 control is used with model AA compressors. It is installed on the cooling unit by means of a clamp soldered to the ice tray sleeve. The principle of operation of this control is based on the theory that the freezing solution used always freezes and thaws at a certain definite temperature and that in freezing, a definite expansion occurs, resulting in a positive powerful thrust for operating the switch.

Cooling Unit

All Capitol Ice-O-Matics equipped with AA compressors were equipped with a KO

cooling unit. A cross section of this cooling unit is illustrated in Fig. 8. The needle valve assembly is also illustrated.

In the forefront of this discussion, it was mentioned that the model AA compressor was not constructed with an oil float valve and consequently, the oil picked up in the compressor by the refrigerant is circulated through the cooling unit. The KO cooling units are constructed with a pan type float. The suction tube extends down almost to the bottom of the pan float at the valve end. During time of violent boiling, liquid methyl chloride will splash into the open float. This liquid will vaporize while the oil which these bubbles contain will remain in the float. This oil will continue to accumulate and when the float is in the closing position, the oil will run to the valve end and be drawn out of the unit through the suction line and returned to the compressor crankcase.

Model X Compressor

It is a recognized fact in refrigeration engineering that there are certain requirements which must be met in a different way in the compressor unit for the smaller household refrigerator than in the larger models. Conversely, some phases of construction which make a small compressor an outstanding unit, are not desirable for larger size compressor units. The Capitol compressor has been designed to meet the requirements in its field, and likewise, the larger compres-

sors are constructed to best meet the needs in their respective fields.

The Capitol unit is compact and built to operate with a minimum of servicing. It is a sealed unit, yet it can be taken apart so that in case service is required, it can be repaired in the field.

Cycle of the Refrigerant

The following paragraphs give an explanation of the operation of Capitol Ice-O-Matic using model X compressor. By following the course of travel of the refrigerant as outlined in the subsequent paragraphs and by referring to Fig. 6, no difficulty should be experienced in understanding how Capitol Ice-O-Matic refrigerates.

The cooling unit, the connecting suction line ($\frac{3}{8}$ "), and the space surrounding the

from the dome through a suction tube extending above the motor. As the pressure is reduced in the dome, the vapors are drawn from the cooling unit through the suction line. The compressed vapors are forced through the discharge flapper valve, on through the oil trap, and then into the condenser where they are cooled and enter the liquid receiver as a liquid. The outlet of the liquid receiver extends nearly to the bottom of the receiver. The vapor in the liquid receiver above the liquid exerts a pressure in accordance with the room temperature, forcing the liquid through the dehydrator and on through the liquid line to the cooling unit where there is a float valve assembly which automatically opens and closes to maintain the proper liquid level in the cooling unit.

The motor is started and stopped by a control which is actuated by a charged bulb element, the bulb of which is installed in a socket on the side of the cooling unit. This,

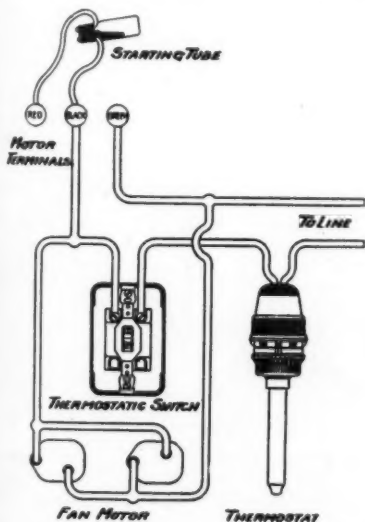


Fig. 4.—Wiring Diagram

motor within the dome and crankcase, contain low pressure vapors during normal operation. Consequently, this part of the system is referred to as the low side.

That part of the system beginning at the flapper valve on the cylinder head of the compressor unit and continuing through the condenser, liquid receiver, dehydrator, and liquid line ($\frac{1}{4}$ ") up to the float valve at the header of the cooling unit comprises the high side of the system.

In operation, the compressor motor reciprocates the piston which draws the vapors

of course, controls the travel of the methyl chloride in the system.

The condenser is cooled by forced draft circulation created by the fan which is operated by a small motor in the condenser compartment. This small motor is started and stopped simultaneously with the compressor motor.

The dehydrator contains calcium chloride. The purpose of this calcium chloride in the system is to absorb any moisture which may be carried through the system by the refrigerant. Methyl chloride is inert with moisture



Fig. 5.—Model X Compressor

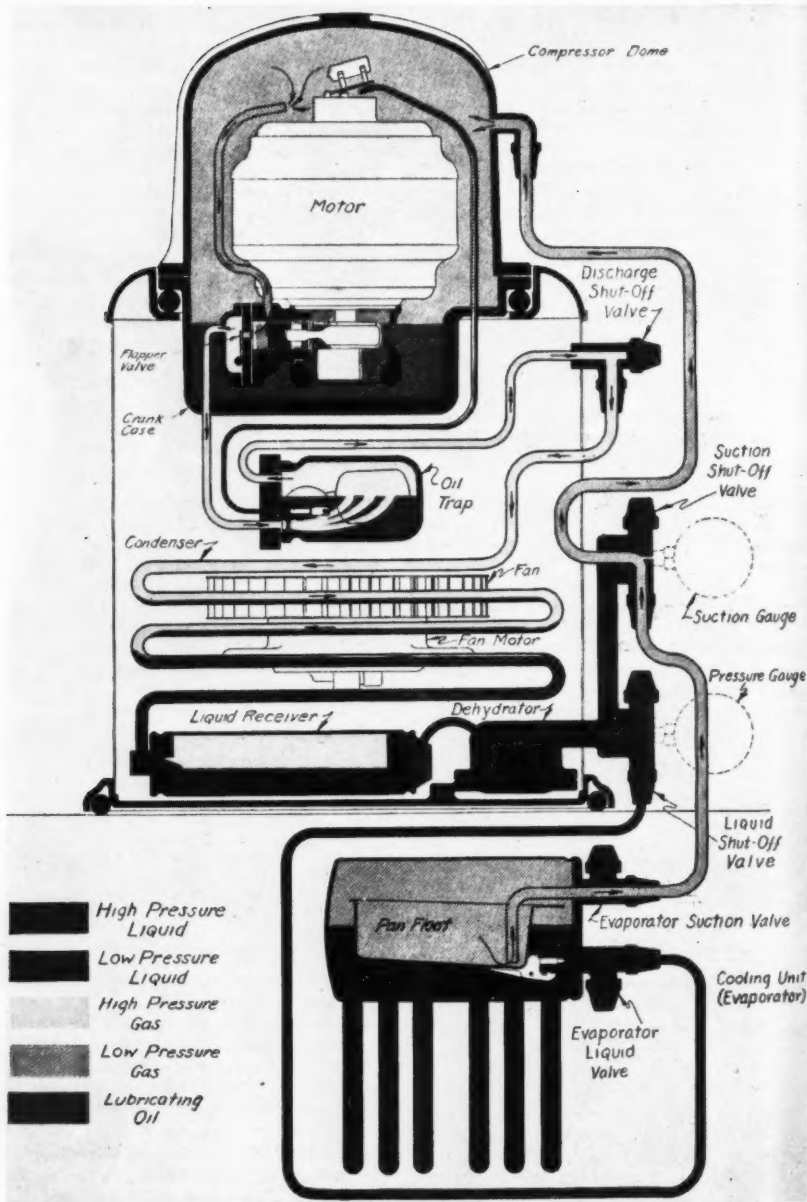


Fig. 6.—Cycle of Methyl Chloride in Capitol Ice-O-Matic

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and if moisture enters the system, no complications are experienced due to corrosion. However, in the event that there is enough moisture in the system and it is carried with the liquid refrigerant to the cooling unit, it may result in the freezing of the float valve. It can, therefore, be readily seen that if some moisture does get into the system through installation or servicing, it will promptly be absorbed by the calcium chloride. Once the refrigerant is freed from this moisture, the dehydrator will have no further duty to perform other than acting as a filter or strainer until some parts of the system have again been exposed to the atmosphere through servicing.

In the foregoing discussion, no reference has been made to the function of the oil trap. Methyl chloride has an affinity for lubricating oil. The cooling units in some models are so constructed that if oil were carried over into that unit, it would be returned to the compressor unit. However, such procedure reduces the efficiency of a refrigerating machine. The warm lubricating oil carries heat units over into the cooling unit. Inversely, the oil removed from the cooling unit and returned to the compressor unit has been lowered in temperature which is further loss of refrigeration. The model X compressor has therefore been constructed with an oil trap. All the compressed methyl chloride vapors are forced through the oil trap chamber before going to the condenser. In this chamber any discharged oil is separated from the vapors. When enough oil accumulates, the float raises opening the needle valve. Inasmuch as there is low pressure in the crankcase and high pressure in the oil float chamber, the oil is returned to the crankcase when the oil valve opens.

Construction of Model X Compressor

The Capitol compressor unit primarily consists of two major assemblies—the upper section comprising the compressor assembly proper, enclosed by the crankcase and dome, and the lower section consisting of the condenser, liquid receiver, and fan assembly (Fig. 7).

Both of the above sections are constructed so that they may be serviced in the field and furthermore, either section may be taken apart without interfering with the interior of the other section. The two sections are held together by two bolts extending from the crankcase to the compressor base. By remov-

ing the two nuts underneath the base and disconnecting the suction connection, the discharge connection, and the fan motor leads, the upper or compressor section may be lifted from the lower condenser section.

All castings which are subjected to vapor or liquid pressure are made of semi-steel with nickel content produced from formulae which insures a close-grained texture of metal. This prevents the possibility of any leakage of methyl chloride through the castings.

Specifications of Model X Compressor

Number of cylinders.....	1
Bore951"
Stroke52"
R.P.M.....	1750 on 60 cycle
H.P.	1/6
Cooling medium	Air
Receiver capacity (Std) (3/4 full) ..	.67 cu. in. or 2.16 lbs.
With auxiliary tank, capacity (3/4 full)242 cu. in. or 7.76 lbs.
Ice melting equivalent:	
10 lb. suction pressure	
90 lb. head pressure	63 lbs.
20 lb. suction pressure	
90 lb. head pressure	90 lbs.
Over-all dimensions:	
Width	17 1/4"
Depth	18 3/4"
Height	18 1/4"

Compressor Section

The space enclosed by the crankcase and dome contains low pressure methyl chloride vapor. Both castings are properly faced and a gasket between the two affords a gas-tight joint. This arrangement very satisfactorily seals the compressor mechanism. However, with the aid of a speed wrench or a T-handle wrench, the dome can be removed in a few minutes, and the working parts within, are then readily accessible. It is, therefore, possible to repair the Capitol unit in the field.

The compressor motor is mounted in a vertical position with the armature shaft extending downward. It is of the split-phase type and is built with a special winding coated with bakelite and baked sufficiently long to make it impervious to any action of the lubricating oil. This motor is not constructed with a commutator and starting brushes for controlling the starting winding.

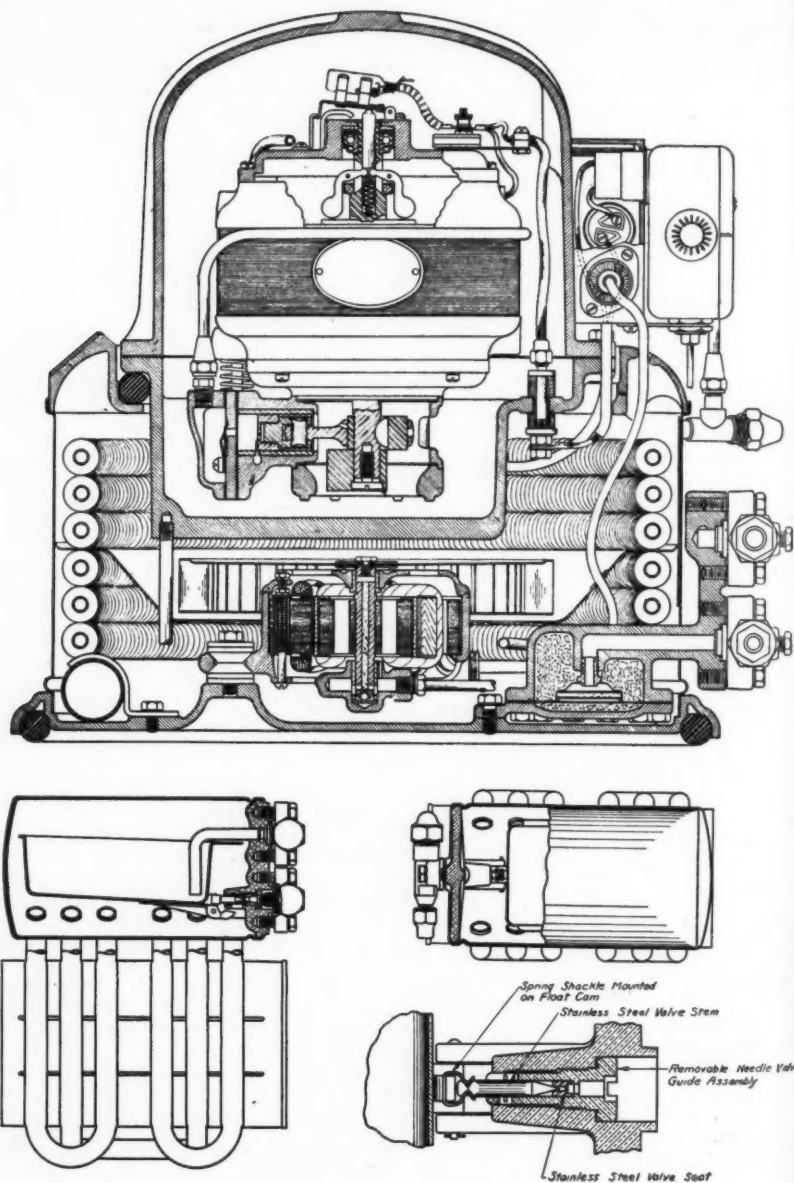


Fig. 7.—Detailed section of Model X Compressor unit with Type KO cooling unit showing needle valve assembly

A mercury tube is used to cut the starting winding in and out. This mercury tube is actuated by a governor mechanism which is built into the motor just below the upper end plate (See Fig. 7). When the motor is at rest, the governor arms drop which together with a spring push the governor plunger upward so that the mercury tube is held in the contact position. When starting, the electrical current passes through the starting winding as well as through the field winding. As soon as the motor is up to speed, the governor arms swing out, pulling the governor plunger downward allowing the mercury tube to drop and cut out the starting winding. When the motor is stopped by the thermostat control, the mercury tube is again raised to the starting position.

The lower end plate of the motor is constructed with four projections which provide supports for the motor and the compressor assembly. The compressor being bolted to this end plate, proper alignment is assured between the motor shaft and the cylinder. The piston is reciprocated at motor speed by an eccentric on the armature shaft.

At each of the four points of suspension, there are two springs below and two above to provide rigid support and at the same time absorb mechanical vibration from the moving parts.

Cylinder Construction

The cylinder block is made of cast iron and a steel lining is pressed into the cylinder block and serves as a cylinder wall. This lining and the piston shell are made of steel of essentially the same composition thereby assuring uniform expansion and contraction. These two parts are held to very close tolerances in grinding. This close fit in conjunction with the oil grooves in the piston enables the lubricating oil to provide a very satisfactory compression seal.

The eccentric strap, the wrist pin, and the piston body are assembled and screwed into the piston shell and locked with a small pin. The factory does not recommend that this assembly be taken apart in the field and if any repairing is required, it is recommended that this assembly be sent to the factory where the necessary facilities are available for assembling and checking.

An elongated port in the piston lining provides passage for the vapors from the suction tube to the compression chamber when the piston is at the intake end of its stroke. This

suction tube extends above the motor so that the methyl chloride vapors are drawn from the upper portion of the dome.

A counter-weight is mounted on the motor shaft to counterbalance the centrifugal force of the eccentric which reciprocates the piston.

The oil return tube from the oil trap chamber extends to the top of the motor and the oil which is separated from the methyl chloride vapors and returned to the crankcase, is discharged over the upper motor bearing and governor mechanism.

Condenser Section

The circular condenser is made of spiral-finned copper tubing. There are six coils of tubing—three above the baffle and three below. The upper end of the condenser is attached to the one-way shut-off valve and the lower end is connected to the circular liquid receiver just below the condenser.

The perforated guard around the outside of the condenser serves as a spacer between the base of the compressor unit and the upper compressor section, and also as a protection for the condenser.

Fan Motor

A small induction motor and fan are mounted in the center of the condenser compartment. This motor is secured to the base of the compressor, but is mounted on rubber cushions to hinder the transmission of mechanical noise. The circular fan is attached to the upper end of the motor shaft. This fan motor is started and stopped simultaneously with the compressor motor. A baffle installed in the condenser enables the fan to draw air in over the liquid receiver and the lower condenser coils, and force this air out of the condenser compartment through the upper condenser coils. The purpose of the forced draft circulation is, of course, to afford better cooling of the condenser which results in less running time of the compressor motor.

Inasmuch as the fan motor is mounted in a separate compartment from the crankcase, individual arrangement must be made for lubrication. The lower end plate of the motor is constructed so as to form an oil sump at the lower end of the armature shaft. The construction of the armature shaft is such that oil is carried upward to assure proper lubrication of the upper bearing surface.

A small copper tube extends from the oil sump in the motor to the rear of the condenser compartment and is equipped with an oil cap. The oil is dropped into this tube and flows by gravity to the oil sump.

Dehydrator

A calcium chloride dehydrator is built into the condenser compartment. The dehydrator housing extends through the condenser at the rear and affords a mounting block for the liquid and suction shut-off valves.

The main body of the dehydrator is filled with calcium chloride and all the liquid refrigerant must pass through this chloride in making a complete cycle through the system. A strainer made of fine wire gauze is constructed in the outlet of the dehydrator

to prevent the calcium chloride from leaving the dehydrator and also to serve as a strainer to catch any dirt or foreign particles which may be carried through the system by the refrigerant.

Junction Box

The electrical connections to both motors, the thermostat control and the service cord terminate in one common compartment at the rear of the compressor dome, known as the junction box. When facing the rear of the compressor, the socket on the right side of the junction box is for the service cord, the socket on the left side is for the fan motor connection, and the socket on the front is the thermostat connection. The control is mounted directly on the junction box and held in place by a bracket.

How Many Valves for Economy?

By H. E. FERRILL *

SINCE the beginning of the commercial refrigeration industry on its present scale, service men and installation contractors have been faced with the question of just how many and what kind of shut-off valves should be included in any particular installation. On one hand is the low-cost, hard-to-service installation equipped with only the valves supplied by the manufacturer of the condensing unit in contrast with the complicated, costly, "gadjetty" system, full of cross-connections and requiring the services of a licensed engineer. Somewhere between these two extremes there must be a common-sense middle ground where the advantages of ease and efficiency of service and convenience to the owner may be attained without making the system complicated or the cost prohibitive.

Extremely low selling prices require the elimination of many accessories necessary to a well-planned installation. In some sections of the country there is, and has been for some time, a marked tendency to eliminate practically all accessories, including valves, even on multiple installations. This

is due to extremely competitive bidding, price-selling and the eagerness of the individual contractors to have the lowest bid as a sales argument.

The wisdom and economy in following this practice can very easily be doubted when factors other than initial cost are taken into consideration. From the standpoint of the contractor making the installation, a small initial saving can be effected if accessories are left out. However, if this contractor assumes the responsibility for the correct and efficient operation of the system during its guarantee period, a certain sum of money must be set aside to provide for repairs, adjustments, etc., made to the system during that time. A comparison between the actual cost to the contractor of service calls made on the job during its guarantee and the amount of money originally set aside as a service reserve is, in the final analysis, the best measure as to whether or not the sale was profitable. If the total cost of service has exceeded the reserve amount, the profit on the job has been reduced accordingly. A large percentage of installations of this type will probably show a loss if analyzed in this manner.

* Engineering Dept., Kerotest Manufacturing Co., Pittsburgh, Pa.

From the point of view of the owner, a scarcity of valves and other necessary accessories means a system requiring unnecessary service calls and adjustments during the guarantee period. These calls are always accompanied by considerable inconvenience and a certain financial loss from food spoilage, loss of business, etc. However, these factors really become serious after the expiration of the free service period. The owner suddenly discovers that, while his refrigeration equipment has increased his profits, these same profits are being reduced by unnecessary, repeated and expensive repairs and adjustments. With the aid of proper accessories and valves, trouble can be better diagnosed and more quickly remedied. The owner realizes, too late, his mistake in buying on price alone and no longer has the faith in the contractor that he had originally.

Another extremely important factor which should be given serious consideration when

The question now arises as to just what valves and accessories should be installed in order to render a system easy to service and convenient to operate. Where the job consists of a single compressor operating on a single coil or low-side, valves other than those supplied by the manufacturer are almost always disregarded and are not as necessary as on the other types of installations. However, shut-off or by-pass valves on both sides of a filter, strainer or permanent drier will materially reduce servicing time and will ordinarily save many times more than their cost during a guarantee period and therefore should not be overlooked. In the absence of a master liquid line strainer, where the liquid line is of considerable length, the by-pass type of receiver valve will pay for itself in one service call due to a plugged expansion valve screen. This valve enables the liquid line to be evacuated even though the expansion valve end is closed, thereby saving considerable costly refrigerant. In sizeable

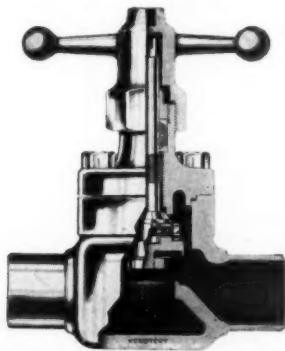
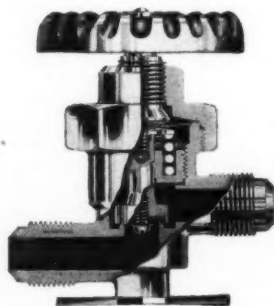


Fig. 1.—Two types of valves frequently used in refrigeration work are: (left) The diaphragm packless valve and (right) The packless globe valve

planning an installation is the possibility of accidents occurring either during servicing or due to faulty operation of some part. It has been the practice in some instances of multiple installations to install receivers whose liquid capacity is far below the total refrigerant charge of the system. Accidents expensive to both owner and service contractor have resulted from attempts to remove the charge from the low-side when high pressure safety devices were absent or inoperative. The presence of proper shut-off valves would have eliminated the necessity of evacuating the entire low-side of the system and would have materially reduced the probability of a serious accident.

installations where receiver valves of this type are not available, a standard three-way valve installed in the liquid line near the condenser as indicated in Fig. 2 will serve the same purpose. This same valve also serves admirably for charging. By reducing the pressure on the low-side and attaching the drum in an inverted position to this valve, liquid refrigerant can readily be introduced into a part of the equipment intended to handle liquid.

On applications where one compressor feeds two or more low-sides located in the same refrigerated space, it is usually desirable to be able to evacuate and repair one low-side while maintaining partial refrigera-

tion by means of the others. Also on meat storage applications additional flexibility for cold weather operation may be attained if one coil can be temporarily closed off. Neither of these desirable features are possible unless suction and liquid line shut-off valves are provided on each coil.

Multiple installations require, by far, the most careful planning and the greatest number of valves and other accessories. In general, each low-side should have its own liquid and suction line shut-off valves. Manifolds as in Fig. 3 are the most common and economical method of providing this feature, although in some cases it is more desirable to install individual shut-off valves near the several pieces of equipment. In cases of large multiple systems it is certainly false economy to overlook proper valves at the time of installation, and later, when servicing is required on a single low-side, to be forced to pump down the entire system. The single operation of evacuating the entire low-side often requires as much time as repairs

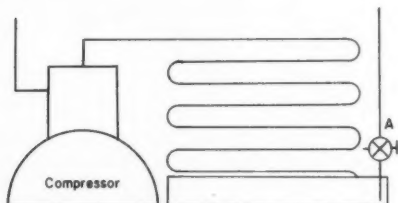


FIG. 2

to the defective coil if it could be isolated. By-pass and charging valves previously referred to in connection with simpler systems should also be included in multiple installations. In general, the larger and more complex the job, the more important it is that it be equipped with the proper valves and accessories.

Regarding the ease of operation and convenience to the owner, ordinarily if an installation is well equipped from a servicing standpoint, it will be convenient to operate. The needs of the owner are usually limited to being able to temporarily close off one part of a multiple installation when that part is not in use or for cleaning purposes. These factors are provided by the valves mentioned above. In connection with low-temperature multiple installations, hot-gas defrosting may be very economically provided by use of a single manifold connected into the compressor discharge line and feeding into the sep-

arate coils. Use of this system allows defrosting of any coil separately while maintaining some degree of refrigeration on the other parts of the system.

Any discussion of the economical aspects of properly equipping an installation would hardly be complete without mention being given to liquid indicators, or sight glasses. These devices are used for the purpose of indicating to the service man or engineer whether or not there is sufficient refrigerant present in the system. A clear flow indicates a normal charge, while bubbles or foam in the liquid shows that a mixture of liquid and vapor is being supplied to the expansion valve and is causing a loss of efficiency. Since it is for the purpose of indicating the nature of the refrigerant passing into the ex-

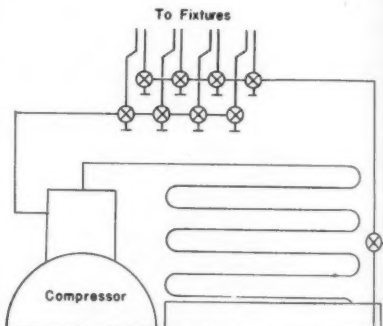


FIG. 3

pansion valve, an indicator should be placed as near that valve as is practicable. On small, close-coupled systems the position of the indicator is of small importance. However, in cases where the liquid line is of considerable length, and where the evaporator is any appreciable height above the condenser, the indicator should be installed near the expansion valve. This is particularly true when dichlorodifluoromethane is used as a refrigerant, since any elevation of the evaporator is accompanied by a noticeable drop in liquid pressure. In extreme cases of this latter type it is advisable to place the liquid indicator between the heat exchanger and the expansion valve, taking advantage of the sub-cooling effect of the heat exchanger and regulating the head pressure to the most efficient and economical point. It has been estimated by experienced engineers that as much as 20 percent of the initial refrigerant charge can be saved if the installation is made in

this manner and the head pressure properly adjusted. Regardless of the size of the job, a liquid indicator removes guesswork from the process of determining whether or not there is sufficient refrigerant present. This saves valuable servicing time and also eliminates the possibility of the job being overcharged in order to "be sure."

Throughout the country the better class of installation and service organizations are gradually coming to the belief that, while installations should be made economically and in a common-sense, logical manner, the best installation is not the cheapest, and the

cheapest is the least economical in the long run. If, at the end of the guarantee period, the contractor finds that he has lost money on servicing some installations, an analysis will almost always reveal poor installation practices. Better planning and the addition of a few well chosen accessories would have at least materially reduced his servicing time, if not eliminate some calls altogether. On the other hand, if he has made a profit on his service reserve, it is usually the case that those installations were well-planned and equipped with the proper accessories and valves.

Eighth Article

Simplified Air Conditioning

By GEO. G. BORDEN

UP until a few years ago air conditioning equipment for stores and restaurants had to be bought piece by piece and assembled on the job. Because several manufacturers made the component parts, there was always a chance that improperly matched equipment would be used and this resulted in a number of unsatisfactory installations. Then too, because the equipment had to be assembled piece by piece the cost of the installation was generally very high and the great amount of work to be done often interfered with the business of the customer.

This latter factor is a very important one because many businessmen will not buy air conditioning in the cooler months of the year. They generally wait until an extremely hot spell forces them to buy. Hence, when they place their order, they want immediate delivery and operation.

In order to provide properly built equipment that is satisfactory in operation and that can be installed quickly with a minimum amount of work and interference with business, the air conditioning industry produced the space conditioner.

The Space Conditioner

The space conditioner is a complete air conditioning unit that can be used to supply either summer air conditioning or complete

year-round conditioning. Generally for ease in handling, the space conditioner is made in two sections that can be bolted together on the job. The upper section contains the fan assembly whereas the lower section contains the complete refrigerating mechanism which includes the high and low sides. Because the lower section contains both high and low sides, the complete refrigerating section can be assembled and tested at the factory. Thus, the space conditioner can be assembled and tested under ideal factory working conditions just like ordinary household refrigerators. This method of factory assembly assures trouble free operation after the units are installed. It also reduces the cost of the complete system because it allows mass production methods.

The installation cost is also greatly reduced because in many locations only water and power connections have to be made at the unit location.

Because of its packaged-type construction, the space conditioner is very saleable in that it is readily portable. Hence, the customer can salvage a very large part of his air conditioning investment in case he should move.

The space conditioner is designed for use inside the conditioned space with or without duct work. In many stores and restaurants the unit can be located in a corner or other

out of the way space in such a way that duct work is not required. An installation of this type is shown in Fig. 2.

The S.A.C. Space Conditioner

The space conditioners shown in Figs. 1 and 2 are manufactured by Standard Air Conditioning, Inc., a division of the American Radiator and Standard Sanitary Corporation. In this line, there are six Space Conditioners ranging in cooling capacity from two to fifteen tons. The cabinets of the two, three, and five-ton units are all the same size, 21½ inches deep by 36 inches wide

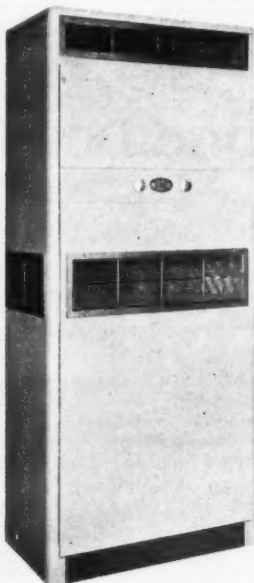


FIG. 1.—S.A.C. CONDITIONER

by 84 inches high. The sizes of the 7, 10, and 15 ton units are considerably larger.

All of these self-contained units are water cooled and hence the only connections needed are two water lines (supply and return) and the power line. The units are made so that they can be used with or without duct work. When duct work is required, the supply and return grilles can be removed and the duct work connected as shown in a typical office installation in Fig. 3.

Fig. 4 is a line drawing of a typical Space Conditioner that shows how the air passes through the unit.

The large squirrel cage fan located in the top of the unit draws air from the room through the intake grilles on the sides and front of the unit and pulls this air upward through the filter. Here a large portion of the dust and dirt is removed from the air. Next the air passes up through the fins of the cooling coil where the air gives up some of its heat and becomes cooled. The air also gives up moisture that is deposited on the fins of the cooling coil and from here the moisture drips into the drain pan below the filter. Because the filter is located under the cooling coil, it is continually wetted by the condensation. For this reason the filter is made out of bronze wool so that it will not deteriorate due to its contact with air and moisture.

From the cooling coil, the air passes next upwards through a steam or hot water heating coil (optional equipment) which in winter time will heat the air. From here the air passes upward through a spray mist generated by two spray nozzles (optional equipment) which humidify the air in winter time. Last the air is drawn into the fan housing and is discharged into the sound-treated chamber at the top of the unit into the room through the discharge air grille. Sometimes called the supply air grille. The supply air grille is equipped with adjustable bars so that the air can be deflected upwards or downwards. A second set of adjustable vanes located behind the grille allows the air to be deflected to either side of the room. Thus this grille provides a very flexible control of the direction of the air flow in the conditioned space.

Panel Arrangement

The S.A.C. space conditioner is equipped with four removable panels that provide ready access to the unit for service purposes. These panels are held in place without the use of screws. To remove the panels, it is necessary to raise them about one-half inch and then lift the panels away from the unit.

With this panel arrangement, several installation methods are made possible. For instance, the front panel for the machine compartment can be interchanged with the rear panel so that the return air can be drawn from the rear of the unit rather than from the front. Also the supply grille at the top of the unit can be used to replace the blank panel at the top rear of the unit so that the supply air can be discharged out

the rear of the unit. In case it is necessary to install the unit outside the conditioned space, the unit can be backed up against the wall, the supply and return grilles can be set in the wall, and short duct collars can be run from the grilles to the grille openings in the units.

Controls

The S.A.C. space conditioner is equipped with two control knobs. The left hand knob has three positions namely, Fan, Off, Cool.

When this switch is set at the Fan position, the fan alone operates to filter and circulate air through the space. In the Off position, the entire mechanism is shut off.

When the switch is set in the Cool position, the fan operates, and the operation of the cooling mechanism is controlled by a

operation of the compressor directly without the use of a low pressure switch. However, a high pressure cut out is provided to protect the machine in case of high head pressures due to insufficient or high temperature water. This high pressure switch is also wired into the holding coil circuit.

When the space conditioner is equipped with a heating coil for winter use, some form of heating control is required. On two-pipe steam systems, a modulating type steam valve is used. The feeler bulb of the modulating valve is located either in the return air stream or in the supply air stream depending on just what service is required of the heating coil. On some installations, the heating coil will be used to supply the entire source of heat for the space whereas on other installations the heating coil will



FIG. 2 AND 3.—SHOWING TWO METHODS OF INSTALLATION

built-in cooling thermostat. The range of this thermostat is set on the right hand knob on the control panel. The thermostat can be set for temperatures between 65 degrees and 85 degrees. A screw type locking device is available to prevent unauthorized persons moving the thermostatic setting.

Although the thermostat is located on the space conditioner, it is operated by the temperature in the conditioned space. This is so because the feeler bulb of the thermostat is clamped to the return air grille in such a way that the return air passes over it. Thus the thermostat actually controls the temperature in the conditioned space.

The thermostat and the master switch control are wired in the holding coil circuit of the starting box and thus control the

be used only to raise the temperature of the outdoor air that is brought into the space for ventilation purposes and thus prevent drafts. The process of raising the outdoor air temperature to prevent drafts is called tempering.

If the space conditioner is used to heat the space, the feeler bulb of the heat control valve will be located in the return air stream in such a way that as the room temperature drops the feeler bulb will open the valve wider and thus supply more heat. As the room temperature rises the return air temperature will cause the valve to close.

On the other hand, if the unit is used to supply tempering, the air leaving the unit should always be below the room temperature so the existing heating system will

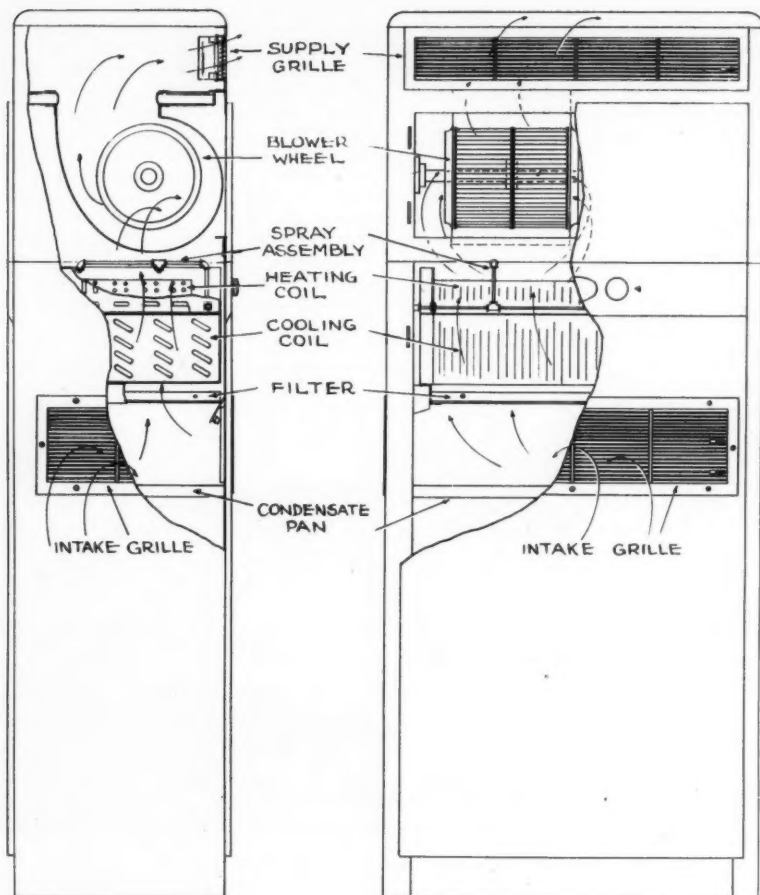


FIG. 4.—PATH OF AIR THROUGH SPACE CONDITIONER

supply the normal heat requirements of the room and the space conditioner will only take care of the heat required by the outdoor air. Under these conditions the feeler bulb of the thermostat will be placed in the discharge air stream so as to keep the air entering at slightly below room temperature.

When the space conditioner is used on hot water heating systems, a circulating pump is used to force the water through the heating coil.

The heat control in the hot water system is obtained by means of a thermostat that

controls the operation of the circulating pump. This thermostat is located either in the return air or supply air streams depending on whether the unit is used for heating or tempering.

Because of the danger of over humidifying the space, a wall-type or window-type humidistat is used to control the operation of the spray nozzles. The humidistat is wired to a solenoid valve in the water supply line to the spray nozzles so that when the solenoid valve is closed, the spray nozzles are shut off from the water supply.

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Servicing Capacitor-Start Motors

By PAUL McKNIGHT DEELEY *

THE capacitor-start type of motor sometimes involves a problem for the plant electrician or serviceman when a check-up of an inoperative motor indicates the need for replacement of the starting capacitor.

First of all there is the excellent possibility that the source of trouble was not in the capacitor and that other improper operating conditions have caused the capacitor to break down. Such conditions must, of course, be corrected before replacing the capacitor. Then, regardless of the cause of the trouble, it is of great importance that the defective capacitor be replaced by one of the correct value and characteristics.

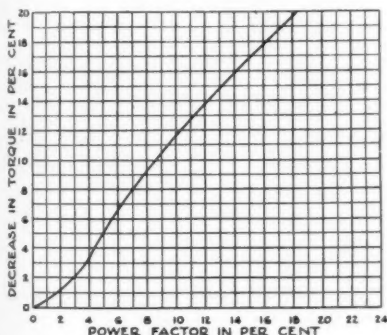


FIG. 1

It is the purpose of this article to offer suggestions which will help the serviceman to diagnose improper operation causes speedily, and facilitate correct capacitor replacement. But first it will be desirable to present some discussion of the requirements for motor-starting service, and of the characteristics of capacitors generally employed; both factors of extreme importance in effectively servicing capacitor-start motors.

The type of capacitor coming into universal use is the a.c., dry electrolytic type with etched foil anodes. By means of the micro-

scopically small hills and valleys resulting from this etching process, the surface area of the foil is tremendously increased over that of the older smooth foil and as a consequence the etched-foil unit is very much smaller than the older type for a given capacity.

Capacitor power factor is of great importance in motor-starting applications as starting torque decreases as the capacitor power factor increases. See Fig. 1. An ideal capacitor would, therefore, have zero power factor. This condition could be approached by increasing the conductivity of the electrolyte, but this would involve sacrifices in life and voltage breakdown limits. In actual practice it has been found that capacitor

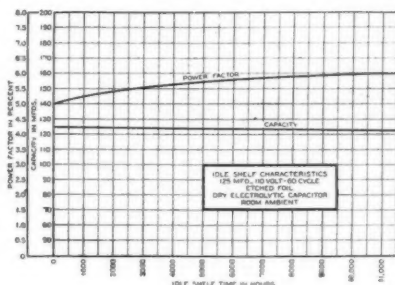


FIG. 2

power factor of around 6 percent is entirely satisfactory for motor-starting service, and design based on this value results in long life and an extra safety factor from the standpoint of voltage breakdown.

Both shelf life and service life, and their effect on operating characteristics, mark the real service to be expected from a capacitor. Tests of typical Cornell-Dubilier etched-foil units show an increase of only one percent in power factor and a decrease of less than two percent in capacity after a full year of idle time on the stock shelves (see Fig. 2). Another group of the capacitors, on accelerated life tests during which each was called

*Chief Engineer Electrolytic Division Cornell-Dubilier Electric Corp.

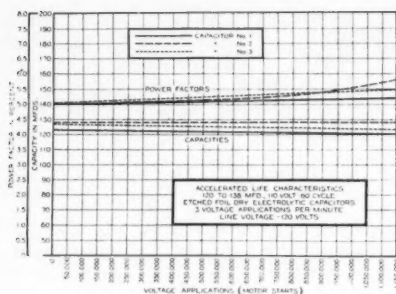


FIG. 3

upon to start a motor a million times at the ratio of three times per minute, showed an average power factor increase of 0.3 percent and capacity decrease of 1.3 percent at the end of the 1,000,000 starts. The results of this test are shown in Fig. 3.

Motor-starting capacitors should be able to withstand occasional application of voltages higher than those at which they are rated. The limiting factor of electrolytic capacitors in this respect is the internally developed heating which they are able to withstand. When a capacitor reaches the limit of safe operating temperature its safety vent (a feature of well designed

motor-starting electrolytic capacitors) will open. This was taken as the critical indication of voltage overload in another series of tests of these C-D capacitors.

In these tests a group of standard capacitors, each rated at 110 volts, were subjected to various excessive voltages ranging up to 195 volts. Voltages were applied intermittently, five seconds each minute, until the vents opened. The one subjected to 195 volts vented after the second voltage application. At 130 volts (the other extreme of test voltages) operation was approximately normal. At 145 volts the test capacitor vented at the 64th application of voltage; at 155 volts, the 40th application; 165 volts, the 28th application; 175 volts, the 10th application, and so on.

Such voltages are highly improbable in a 110-120 volt circuit, but definitely indicate that these capacitors are well able to withstand any reasonable over-voltage to which they may be subjected, even in abnormal circuits.

Special types of etched-foil electrolytic capacitors are available for continuous operation, but these are limited to those not exceeding 50 mfd. in capacity and voltage ratings not over 25 to 30. Motor-starting capacitors for operation at 110 volts (110-120

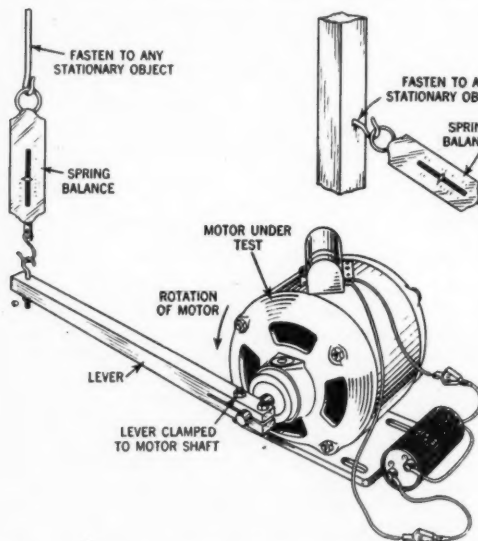


Fig. 4—Illustrating a simple method of measuring locked-rotor torque, an important step in determining proper value for replacement starting capacitor.

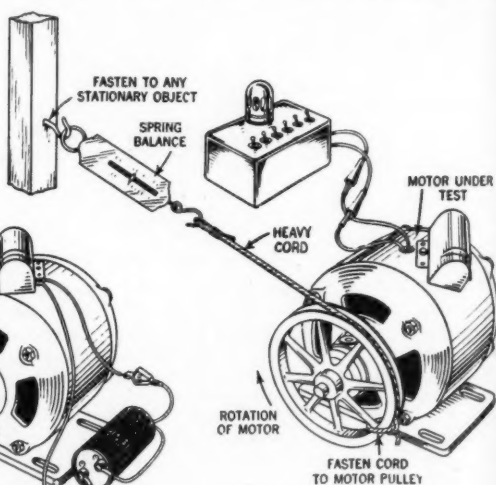


Fig. 5—Similar to Figure 4 but using a pulley instead of a lever.

volts), 60 cycles, are for intermittent use only. In all such service a certain amount of heat is developed, varying with the frequency and duration of voltage applications. The capacitors mentioned above, for instance, are guaranteed to operate within safe temperature limits at 20 voltage applications per hour if each application does not exceed three seconds; or its equivalent—60 applications per hour where voltage is not applied for more than one second at a time.

Operating temperatures up to 60 degrees C. (140 degrees F.) are safe. In fact capacity increases slightly (about five percent) at this temperature, as compared with normal temperatures, and power factor drops to about four percent. At the other extreme, satisfactory operation has been obtained at temperatures as low as 85 degrees C. (121



Fig. 6—The "Test-Mike"—Similar to the "Service-Mike" but with different capacity values instantly selected by means of toggle switches, and with the added refinement of a pilot light for checking cut-out switch operation.

degrees below zero, F.) At temperatures below 0°C. the power factor increases rather rapidly, but this condition is self-correcting because the application of voltage results in temporary high wattage dissipation in the capacitor with practically instantaneous temperature rise and consequent decrease in power factor. Even at the extreme temperature of -85 degrees C. mentioned, full starting torque was obtained in less than one minute after application of voltage.

The characteristics of these a.c. etched-foil electrolytic condensers have been covered in considerable detail because an understanding of these characteristics is highly desirable in determining causes for defects developed in the starting capacitor.

It has been pointed out that too frequent voltage applications, or voltages applied for excessive periods of time, result in excessive heating of the capacitor and consequent failure. Of these two possibilities the more common cause of breakdown is prolonged application of voltage to the capacitor through.

1 a defect in the automatic switching arrangement employed to cut out the capacitor when the motor reaches operating speed,

2 excessive starting load on motor,

3 tight bearings, and 4, low line voltage.

If the capacitor switch does not cut off within three seconds it is an indication that some one or more of these conditions exist. In most cases a fully loaded motor of the fractional horsepower type will cut out the



Fig. 7—The "Service-Mike"—a compact, multiple unit which provides capacities from 18.75 to 150 mfd. for use in determining correct replacement values for motor-starting capacitors.

capacitor within one second. A simple check is obtained by connecting a small lamp across the capacitor terminals, such as a neon or 10-watt Mazda lamp. This will light when voltage is applied, but will go out when the capacitor switch operates and can be timed easily. It will not at all affect the capacitor operation.

If this discloses that the starting operation is slow further checks on the switch, load, bearings, line voltage, etc., should uncover the specific cause.

It is assumed that a capacitor of the correct capacity value is employed. If such is not the case full starting torque will not be obtained and starting, even under normal motor load, will be slow.

In replacing the motor starting capacitor it is frequently found that the old unit is either unmarked, or the capacity value markings have been obliterated. Yet it is of the utmost importance that the replacement unit be of the correct value for that particular motor, otherwise the effectiveness of the starting operation is greatly decreased. This is true both of capacity values that are too high and those that are too low. There is not standard "all-purpose" value and with different motors requiring anywhere from 20 to 150 mfd. capacity, it is obvious that there is little room for guesswork.

Where the serviceman encounters such a condition as this the only logical procedure is to try different values of capacity to de-

The capacitor which causes the shaft to exert the greatest pull, as indicated directly by the scale of the spring balance, will be the proper one for the job.

To facilitate the job of trying different values until the correct one is found, capacitor test units have been made available to servicemen by Cornell-Dubilier. These are known as the "Test-Mike," Fig. 6, and the "Service-Mike," Fig. 7. The "Service-Mike" is a cylindrical type multiple capacitor with four terminals. By connecting the test leads to different combinations of the terminals (Fig. 8), twelve different capacity values ranging from 18.75 to 150 mfd. are obtained. The "Test-Mike" is a de luxe version of this instrument which speeds up test work through employing toggle switches to provide this same variety of capacities (Fig. 9). In addition this model also incorporates a hooded pilot lamp for use in checking for delayed action of the capacitor cut-out switch, etc. These instruments, besides saving test time also provide accurate checks

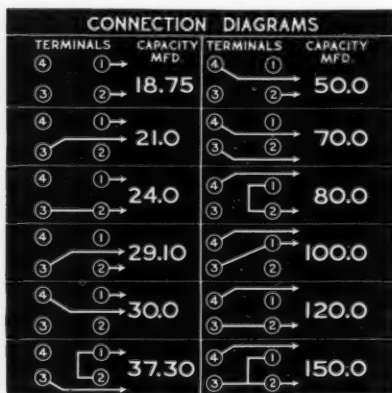


Fig. 8—Connection arrangements by means of which 12 capacity values are obtained from the "Service-Mike."

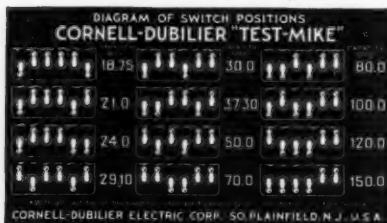


Fig. 9—Switch positions for selection of different capacity values provided by the "Test-Mike."

termine the one that provides maximum locked-rotor torque in the motor. This is easily accomplished by attaching an ordinary spring balance (one capable of measuring up to 15 or 20 pounds serves all ordinary purposes) to the motor shaft in such a way that the amount of "pull" will be measured. Figs. 4 and 5 show two methods for doing this. In Fig. 4 a lever is temporarily clamped to the shaft and to its free end is attached the spring balance which in turn is anchored to some stationary support. When the motor is started its "pull" will be measured in pounds on the balance scale.

The method illustrated in Fig. 5 is similar, except that a pulley replaces the lever. A heavy cord secured to this pulley and to the balance scale will again indicate the amount of "pull."

without the necessity of carrying a large number of individual capacitor units in the kit.

In using those instruments, or indeed in using individual capacitor units, in locked-rotor torque tests it is important to bear in mind that power should be applied to the motor only as long as required to make the necessary scale reading; never more than three seconds. The capacitors will not stand long-continued application of voltage. Moreover, the windings of the motor will heat up in a few seconds when the rotor is locked.

When the correct replacement value has been determined a permanent connection of a suitable capacitor should be made. However, in case of necessity either the "Service-Mike" or the "Test-Mike" may be continued in use until such time as the permanent re-

placement unit can be obtained and installed.

It should be emphasized that capacitors of the a.c. electrolytic type are not suited to continuous application of a.c. voltages and for that reason should never be used in any motor application except starting service.

For capacitor or condenser motors which employ a "running" capacity an entirely different type of capacitor is employed and any attempt to utilize an electrolytic capacitor for replacement of one of those will simply result in a ruined capacitor.

Third Article

The Chemical and Mechanical Aspect of Locker Storage Plants

The November issue contained a discussion on the compressor capacities power requirements and layouts of the locker plant.

By MARTIN G. LANE*

MANY locker storages do not have sharp freezers, but it is a well known fact that products frozen quickly are of better quality than slowly frozen goods. Meat and other products if placed on shelves in a room at 10 or 15 degrees below zero will freeze much more rapidly than when placed directly in a locker where the temperature is only 10 degrees F. The size of the freezer need not be large. If we estimate the amount of product frozen per day at 1000 pounds and allow a shelf area based on 8 pounds of packaged goods per square foot of shelf area, the amount of shelf area necessary is 125 square feet. Shelves can be conveniently made of pipe placed 6 inches apart horizontally and 18 inches apart vertically. Six pipes placed side by side with a galvanized iron sheet laid on top of the pipes will make a very satisfactory shelf about 36 inches wide. By placing 5 of these shelves, one about 18 inches above the other, along one side of a room 9 feet long, sufficient shelf area is available. An aisle about 30 inches wide is ample for passageway, and if an additional space of 30 inches is allowed for hanging of goods to be frozen in that manner, enough capacity is provided for a plant with about 500 lockers. This requires a room 8 feet wide and 9 feet long inside.

*Eureka Engineering Service, Sioux City, Iowa.

Shelf coils should be made of straight lengths of pipe slightly shorter than the length of the room. The ends should be connected to return bends in such a way that the first pipe of each shelf is connected to the first pipe of the shelf below and the other end connected to the corresponding pipe above. There will be as many elements as there are pipes in each shelf, six in this case. Each element should be supplied with refrigerant at the bottom and the vapor removed at the top. Either 1½-inch pipe or 2-inch pipe can be used for shelf coils, but 2-inch is preferable. With 2-inch coils the internal area of the pipe is large enough for the vapor to separate from the liquid and flow along the top, whereas in the case of 1½-inch pipe the vapor does not separate from the liquid so readily, and the liquid is carried along in slugs. It is important to get the vapor out as quickly as possible in order that the coil may operate more efficiently.

In addition to the shelf coils there should be coils on the ceiling with a space of about 8 inches between the ceiling and the pipes to facilitate air circulation. The ceiling coils will have sixteen pipes, and if the room is 8 feet long, these pipes can be considered as 9 feet long including the return bends. The number of pipes in the shelf is six per shelf, thus five shelves will give 30 lengths. The total number of lengths is then 16 plus 30

or 46, and at 9 feet per length this amounts to 9×46 or 414 lineal feet of coil. A room $9 \times 8 \times 10$ feet has a volume of 720 cubic feet. The number of cubic feet of space per lineal feet of pipe is $720 \div 414$ or about $1\frac{3}{4}$. Many sharp freezers have less pipe than this, but large pipe surface contributes to more economical operation. Increased efficiency can also be obtained by operating the freezer coils flooded by any one of the approved methods.

In order to estimate the machine capacity 2 B.t.u. per square foot per hour per degree may be used as a heat transfer coefficient, a freezer temperature of minus 15 degrees F. and an evaporating temperature of minus 25 degrees F. The amount of surface in 414 lineal feet of 2-inch pipe is $414 \div 1.6$ or 259 square feet. The amount of heat the pipe will absorb is $UA (T_1 - T_2)$, where U is the heat transfer coefficient in B.t.u.

at 80 degrees F. it will have 132 B.t.u. per pound. The refrigerating effect per pound is $603.2 - 132$ or 471.2 B.t.u. To absorb 5,180 B.t.u. per hour it is necessary to circulate $5,180 \div 471.2$ or nearly 11 pounds of ammonia per hour. This is 11×16.66 or 183.3 cubic feet per hour. The effective displacement of the compressor is $183.3 \div 60$ or 3.05 cubic feet per minute. A single cylinder compressor 3×3 making 250 revolutions per minute will have sufficient capacity, although a slightly higher speed would allow for a greater margin to provide for emergency overloads. This machine should be controlled automatically so as to maintain a constant coil temperature of -25 degrees F.

It is desirable sometimes to place the freezer room inside of the locker room proper and it is so shown in the plant under consideration. This arrangement provides

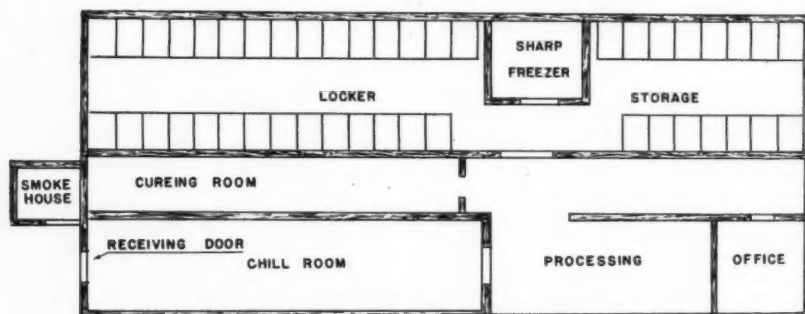


Fig. 4—Floor plan of a locker plant with the freezer inside the locker room.

per square foot per hour per degree F., A is the area in square of the evaporator T_1 is the room temperature and T_2 is the evaporating temperature in degrees F. Numerically this then gives $259 \times 2 \times (25 - 15)$ or 5,180 B.t.u. To freeze and cool a pound of meat requires approximately 110 B.t.u. Some meat requires more some requires less. One thousand pounds of meat requires 110×1000 or 110,000 B.t.u. If this load is spread over twenty-four hours the heat to be absorbed per hour is about 4,580. This allows us a margin of $5,180 - 4,580$ or 600 B.t.u. to provide for losses and leakage.

The method of estimating the compressor for the freezer is as follows: The volume of a pound of ammonia at -25 degrees F. is 16.66 cubic feet. The total heat of the dry vapor is 603.2 B.t.u. per pound.

If the liquid comes to the expansion valve

several advantages. The air in the locker room is at a low dew point and when it gets into the freezer as the door is opened it does not carry as much vapor into the room as warmer air would and hence does not accumulate frost so quickly on the freezer coils. The heat leakage can be more easily kept low, and much of the loss of refrigeration from the freezer room goes to the locker room instead of escaping to the outside. By a system of careful planning, the distance the goods must be moved to transfer them from the freezer to the locker is reduced to a minimum.

Insulation

Insulation is a subject that has received much abuse and it is a far cry from the days of sawdust and shavings to the present

highly developed types of insulations and insulating materials. The success or failure of any kind of cold storage is largely due to the effectiveness of the insulation material used. There are several materials on the market now that have high insulating qualities. Cork, Palco Wool, and bonded Celotex are quite common today and when properly installed are very effective insulations. A good insulation must be used to reduce leakage through walls, ceilings and floors at all times and since this leakage is taking place at all times it is worth considerable study. Cork has long been used for low temperature insulation. It has a high resistance to heat flow. This fact is due to the cellular construction of the cork and each of the cells

because if they are not airtight, they will not be moisture proof. Moisture tends to travel into the insulation from the warm to the cold side. It enters the warm side as a vapor but as it penetrates the insulation its temperature drops as it reaches the cold side and when the dew point is reached, condensation takes place. If the temperature is below freezing, the moisture freezes and not only reduces the resistance of the wall to heat flow, but also rapid deterioration sets in. The following illustrates the process by which moisture penetrates a wall. It may be assumed that air on the warm side is 70 degrees at 50 percent relative humidity. The water vapor in air is steam, and the pressure of this steam is equal to the pressure cor-

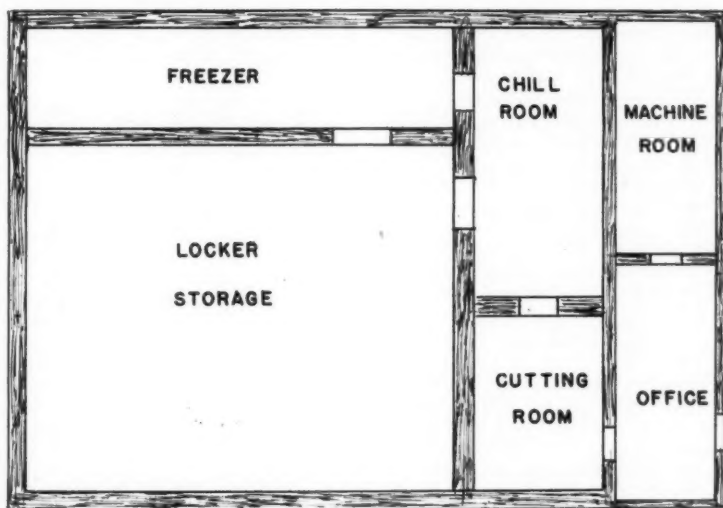


Fig. 5—Floor plan of a popular arrangement in small locker plants.

contains air. Air is one of the best known insulators and any material that contains a great number of individual air cells makes a good insulator. The more thoroughly the air is confined the better the insulating characteristics. Many so-called dead air spaces allow more or less circulation of the air to the extent they do not permit circulation, their value is reduced. A good insulation must not only have good insulating qualities, but must also have considerable structural strength. The most important consideration in any cold storage insulation is moisture. Every possible effort should be made in construction to build cold storage walls airtight

responding to the temperature as given in the steam tables, multiplied by the relative humidity. The pressure of saturated water vapor at 70 degrees F. is 0.74 inch of mercury. If the relative humidity is 50 percent the actual pressure of the vapor is 0.74×0.5 or 0.37 inch of mercury. Now let us take a room being held at 10 degrees F. and 90 percent relative humidity. The pressure of the saturated vapor at 10 degrees F. is 0.063 inch of mercury and if the relative humidity is 90 percent, the actual pressure is 0.9×0.063 or 0.0567. The difference in pressure of the vapor on the two sides of the wall is $0.37 - 0.0567$ or 0.3133 inch of mercury.

This pressure difference is equivalent to about 22.5 pounds per square foot.

By way of comparison, the maximum wind pressure used in the design of exposed surfaces such as bridges, chimneys, and high buildings is only about 30 pounds to the square foot. Obviously the pressure available to drive vapor through a wall may be very large, and only the greatest care must be used to make the warm side of the wall airtight. Some designers call for waterproofing on both sides of the insulated surface. Others maintain that the cold side should not be airtight, but should be vented to allow any moisture that may be in the wall to escape into the cold room. Since there is no tendency for the moisture to penetrate the wall from the cold side because of vapor pressure difference, it is not so necessary to make the cold side airtight. If the warm side is airtight, however, no moisture can penetrate and there will be no need for venting on the cooler side. Furthermore, if the moisture can enter it will not pass through instantly and the result is a wet wall, which is a poor insulator. Again let the point be emphasized of making the outside surface of all insulated walls airtight. There are several methods of construction. Manufacturers upon application will furnish typical specifications for proper installation of their product.

Insulation Calculations

The insulation value of a wall depends on the resistance of heat flow offered by the material in the wall. In order to illustrate the method of computation to follow in calculating the insulation value, it may be assumed that the wall consists of two thicknesses of $\frac{3}{4}$ inch sheathing on each side with 8 inches of fill insulation between. Conductivity is expressed in terms of B.t.u. that can get through a square foot of material one inch thick in one hour when the temperature difference between the two sides is one degree F. The resistance is the reciprocal of conductivity. The total resistance is the sum of the individual resistances. The over all heat transfer is the reciprocal of the total resistance or $1 \div$ total resistance. In an illustrative case there are 4 three-quarter inch thicknesses of fir sheathing. Fir has a conductivity of 1. The resistance of the four thicknesses is $(4 \times 0.75) \div 1$ or 3. If the fill in insulation used in this particular job has a conductivity of 0.33, the total resistance offered is $8 \div 0.33$ or 24. The in-

side surface of the wall will offer some resistance because of the stagnant film of air next to the surface. This can be taken at 0.7. The resistance of the outer surface can be taken as zero without serious error as the air circulates over this surface fast enough to remove the stagnant film of air. The total resistance is the sum of $3 + 24 + 0.7$ or 27.7. The heat transfer is then $1 \div 27.7$ or 0.036 B.t.u. per square foot per inch per degree F. temperature difference between the outside and the inside wall. This is called the heat transfer coefficient for the wall and is designated by the letter U. The value of the letter U can be expressed for any given wall for this type of work by the following formulae.

$$U = \frac{1}{\frac{T_1}{K_1} + \frac{T_2}{K_2} + \frac{T_3}{K_3} + 1 \div K_4 \text{ etc.}}$$

In this formulae T_1 is the thickness of the material for which K_1 is the conductivity and so on for as many different kinds of material as make up the wall. The quantity $1 \div K_4$ is a resistance factor for a surface. The value of K for a surface is not given in terms of thickness but in terms of conductivity of the film. No appreciable error is made if the surface resistance is neglected in calculations for the coefficient for cold storage walls because the surface coefficient is small compared to the resistance of the insulation. The same is true of building walls outside of insulation, particularly brick, brick veneer and concrete walls. In order to decide how much insulation to use in any given case it is a good plan to study it from a point of economics.

If costs of insulation and refrigeration are known it is possible to find the most economical wall thickness. For an illustration, let us suppose that we are considering a wall that has a coefficient of 0.05. What will be the effect of an additional inch of insulating material having a conductivity of 0.31 B.t.u. per square foot per inch thickness per degree F. difference per hour? The coefficient for the thicker wall will be:

$$\frac{1}{\frac{1}{0.05} + \frac{1}{0.31}} = \frac{1}{20 + 3.22} = 0.043.$$

If the temperature difference is 65 the heat transfer through the wall will be 0.05×65 or 3.25 B.t.u. per square foot per hour, while in the second case it will be $0.043 \times$

65 or 2.80. Increasing the thickness of the insulation one inch will effect a saving of 0.45 B.t.u. of refrigeration per square foot per hour or 3,940 B.t.u. per year per square foot.

With electrical energy costing .02 cents per kilowatt hour and a power requirement of 1.8 kilowatt per ton, the saving in the power bill would be $1.8 \times 2 \times 3,940$ or

12,000

\$1.18 cents per year. In order to save this amount in fixed charges, including interest, depreciation, insurance and taxes at 18 percent, $1.18 \div 0.18$, or 6.56 cents could be invested to break even. Whether or not the thicker wall is used should depend on whether it costs less or more than 6.56 cents per square foot for the extra inch of insulation. Obviously if the cost is less, the added material would be used. Each inch that is added though will show a smaller advantage and when a thickness is reached where the saving does not exceed the fixed charges on the additional investment, further addition of insulation would result in an actual loss.

From a refrigeration standpoint it can be seen thus far that there is no really serious problem to solve from the equipment size and calculations. But whatever one does in the selection of refrigeration equipment and insulation secure the service of a good competent and neutral engineer to go over the entire problem with you and the number of mistakes at the finish will be reduced to a minimum.

Size Plant to Build

There is an approximate ratio between the number of lockers that can be profitably operated in a community and the number of farm families and city families residing in the area. Through experience, that ratio has been found to be 240 lockers for each 1000 people. It is well to consider that a small plant completely filled is much better from an economical standpoint than a large one half filled. As the demand for frozen foods increases the demand for locker storage will also increase. The widespread use of refrigeration in the average home makes possible the proper preservation of these frozen foods after they are removed from the community storage and I like every other engineer having anything to do with this field feel that the use of locker storage will increase as time goes on. A check-up of a large number of plants

has revealed the following pertinent facts, that with electric current at an average cost of .05c per kilowatt hour for the first 100 kilowatts and .03c for the balance the power bill will run from \$1.25 to \$1.50 per locker per year. Inasmuch as the custom butcher usually receives for wages the income from butchering, processing and sales of meat to locker renters, the operating costs become the material item of expense and should naturally be very carefully considered at the time equipment purchases are made.

On a plant costing \$6,000.00 installed and occupancy based on 80 percent the following figures are interesting.

Gross Income per Year

Annual rental 240 lockers at \$10.00 per locker	\$2,400.00
Average number of pounds of products per locker per year 800 pounds. 240x800x.01½	2,880.00
(This includes the grinding of hamburger and sausage.)	
Profits on sale of meats to renters at only .08c a pound mark up and estimating one-fourth of the total products handled or 200 pounds of products per locker per year..	1,440.00

Gross income\$6,720.00

Total Expense per Year

Average electric bill on a 240 locker plant	\$ 425.00
Butcher salary	1,500.00
Special paper and string.....	210.00
Heat and light for office.....	120.00
Taxes	90.00
Interest on \$6,000.00 investment at 6%	360.00
Amortization on \$6,000.00 investment at 10%	600.00
Rent \$35.00 per month \times 12 months	420.00
Other expense and advertising.....	150.00

Net expense\$3,875.00
Gross income\$6,720.00
Net expense 3,875.00

Net profit\$2,845.00

Typical Process Charges

Regular size locker with one key, per year	\$10.00
Lower drawer lockers bottom row one key, per year.....	12.50

Service Charges

Hogs—

Butchering up to 300 lbs.....	\$1.25
Butchering from 200 to 400 lbs....	1.50
Butchering 400 lbs. and up.....	1.75

Cattle—

Butchering up to 500 lbs.....	1.00
Butchering from 500 to 750 lbs....	1.50
Butchering from 750 and up.....	2.00

Butchering lamb50

Cutting lamb75

Trimming, cutting, freezing with
paper furnished, per lb..... .01½

Handling charges on meat not cut
here with paper furnished..... .01

Lard rendering hogs up to 300 lbs.,
per head75

Lard rendering hogs above 300 lbs.,
per head 1.00

Grinding and wrapping, per lb..... .01½

Double grinding and wrapping, per lb. .02

Seasoning, per lb..... .01

Sausage stuffing charges (includes
grinding, seasoning, casing and
stuffing), per lb..... .06

Beef middies, per lb..... .07

Meat curing (brine or dry cure)—

Ham and shoulders, per lb..... .08

Bacon, per lb..... .02

Poultry—(Dressing, wrapping and
storing)—

Chickens—(picked and drawn with
liver, heart and gizzard cleaned and
wrapped, head and feet off, per
bird10

Cut to fry, extra per bird..... .05

Freezing and wrapping, per bird... .01½

Ducks—

Picked and drawn, per bird..... .15

Wrapping and freezing, per bird.. .02

Geese and Turkeys—

Picked and drawn, per bird..... .20

Wrapping and freezing, per bird.. .03

Engineering Data Relative to Product Load

B.t.u. required to cool meat ½ beef and
½ pork from 90 to 36 degrees F. chilling
room, based on 18 hours operation including
losses in product load, per 24 hours.

50 pounds.... 1728 200 pounds....22212
100 pounds....11106 500 pounds....20800

Sharp freezing room, B.t.u. ½ beef ½
pork from 45 to —10, 55 degree reduction.

50 pounds.... 5553 200 pounds....33318
100 pounds....11106 500 pounds....67000

MINNEAPOLIS HONEYWELL MODUTRON SYSTEM OF CONTROL

FOR some time it has been recognized that the comfort results produced by direct expansion air conditioning systems can be greatly improved by modulating the refrigerating effect, but no practical way to easily meet this need on existing installations as well as on new ones, has been available. To meet this need the new Minneapolis-Honeywell Modutron system provides an exceedingly simple arrangement for securing the proper modulation of the liquid flow to give the best comfort results from the point of view of both temperature and relative humidity.

The Modutron System may be applied to any refrigeration installation employing

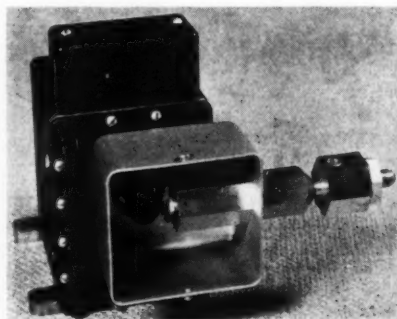


Fig. 1—The Modutron Control.

thermostatic expansion valves with the usual external equalizer. A small electrically operated valve, known as the V543 Modutron, is installed in the equalizer line of the thermostatic expansion valve. The electric motor which operates the valve is modulated by temperature, humidity, pressure or any other condition to be controlled and opens the valve wide when maximum cooling is required. Under these conditions, the refrigeration system operates in a perfectly normal manner at maximum capacity as determined by the expansion valve.

If less refrigerating effect is required, the electric motor moves the valve to a more closed position, reducing the effect of the external equalizer on the expansion valve. Since the inlet pressure to the coil will be higher than the outlet pressure because of pressure drop through the distributor and coil, the expansion valve is then affected by

a higher pressure than when the Modutron is wide open. As a result the expansion valve operates at a higher super-heat. When the Modutron is completely closed, the expansion valve is affected only by the pressure of the refrigerant leaving the valve, and on most systems, the capacity will then be reduced to about 60 percent or 70 percent of full load capacity.

On jobs requiring further reduction of capacity, the W58 orifice may be added. This orifice bleeds a small constant quantity of liquid into the pressure chamber of the expansion valve from the liquid line. When the Modutron is wide open, this quantity of

coil is used on a compressor, modulation down to 40 percent or 50 percent of the full capacity may often be obtained without the use of any additional equipment, such as a suction pressure reducing valve. On systems where several evaporators are employed it is usually possible to modulate down to the minimum capacity permitted by the expansion valve on individual coils.

It is also possible for one Modutron to control as many as three evaporators by connecting together the equalizer connections from the expansion valves, and allowing the Modutron to control all three simultaneously. If sequence operation of the coil is desired,

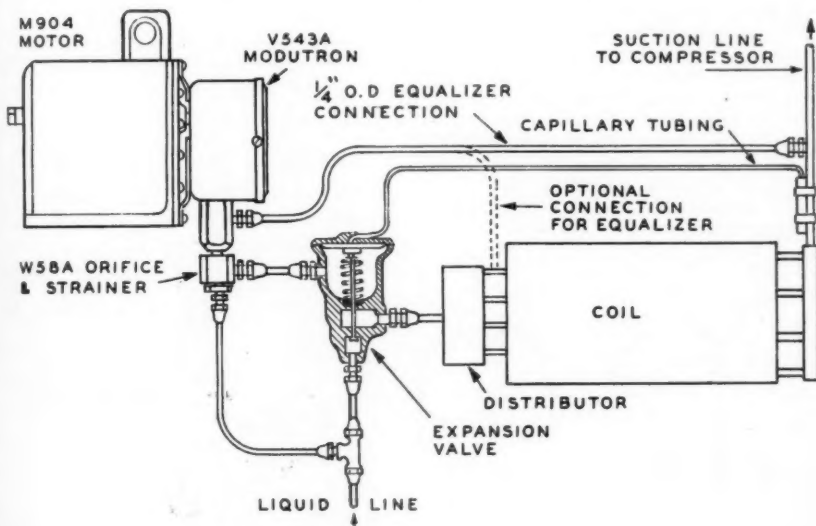


Fig. 2—Method of connecting the Modutron control.

liquid has no effect on the expansion valve. When the Modutron is tightly closed, the liquid is sufficient to build up the closing pressure in the expansion valve and practically close it. Thus the addition of the W58 orifice to the V543 Modutron gives modulation from full capacity down to between zero and 20 percent, depending upon the characteristics of the expansion valve.

It should be noted that the capacity reduction is secured without changing the air velocity over the coil, and that hence it is possible to modulate to a lower suction pressure than otherwise without danger of frosting the evaporator, even though only one coil may be used on the system. Thus, where one

it may be obtained with a very slight sacrifice in total capacity by adjusting the expansion valves for different degrees of super-heat. For example, if two valves and two evaporators were used, one expansion valve might be adjusted for 20 degrees super-heat, while the other is adjusted for 10 degrees super-heat. Then when the Modutron starts to throttle the equalizer connections, the valve adjusted for the higher super-heat will start to throttle more quickly and to a greater degree than a valve adjusted for the lower super-heat.

Pneumatically operated Modutrons and direct temperature operated models with a remote bulb will be available at a later date.



SERVICE KINKS

Tools and Equipment You Can Build



Under this heading will appear simplified or short cut methods of performing individual service operations; also details of how you can build special tools and equipment for your own use. Readers are invited to submit information for publication under this head.

High-Low Temperature Alarm

THERE are many installations where a high or low temperature alarm may save many dollars worth of spoiled products or save considerable worry and watchfulness on the part of the operator. Such a device is particularly useful on milk and fox farms, dairy farms, refrigerated trucks and other installations where gasoline engines must be used for power, and starting of the equipment must be done manually.

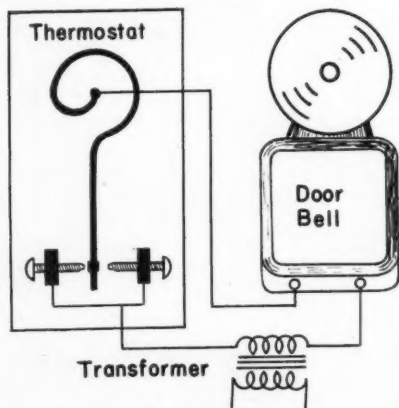


Fig. 1—A simple temperature alarm.

A temperature alarm is also valuable in electrically driven installations where the product being cooled is of such delicate nature that it will spoil with too high or too low a temperature. It is often that the temperature has reached the danger point before it is discovered that the equipment is not functioning correctly and by the time repairs have been made the product is no longer salable.

These troubles can be overcome by installing a room type thermostat in the refrigerated space and connecting it to a door bell

as shown in Fig. 1. The thermostat may be one of an inexpensive type and should be set so that the contacts on each side of the Bimetallic arm will make at about two degrees above and two degrees below the normal working temperature range of the refrigerated space.

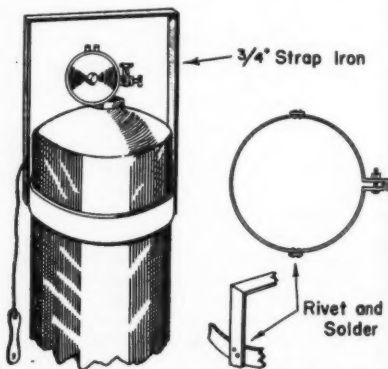
The thermostat of course should be located in a place where warm air will not strike it each time the door is opened.

Handle for Prest-O-Lite Tank

By JACK JOSEPHSON, Bridgeport, Conn.

THE larger size Prest-O-Lite tanks are the most economical to use but are very difficult to carry since no handle is provided.

The handle illustrated here overcomes this inconvenience and is very inexpensive to



A handle of this type makes carrying of these tanks easier.

make. Three-quarter inch strap iron can be used for both the circular band and the handle. A quarter-inch stove bolt will be sufficient to draw the band tight around the tank. Electric tape may be wrapped around the handle to provide a better grip if desired.

Service Analyzer

By JACK JOSEPHSON, Bridgeport, Conn.

HERE is a simple compact analyzer and charging device which combines several pieces of your regular equipment into one unit. It provides much of that visual proof to your customer which helps so much in justifying your service charges.

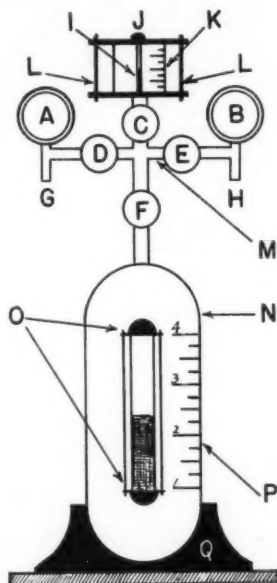


FIG. 1

- A—Pressure gauge
- B—Compound gauge
- C—Oil release valve
- D—High pressure valve
- E—Suction pressure valve
- F—Charging valve
- G—Connection to high side
- H—Connection to low side
- I—Pocket thermometer inserted through flanges
- J—Oil refill plug
- K—Graduated glass cylinder
- L—Bolts through flanges
- M—Brass pipe cross $\frac{3}{8}$ -inch
- N—3-lb. service drum
- O—Standard water gauge
- P—Graduations in pounds
- Q—Rubber drum cup on wooden base

This instrument provides a means of taking pressure readings and room temperatures, of setting controls, purging, adding refrigerant or oil and provides a bypass for use in other operations. It provides a visual indication of the amount of refrigerant and oil charged into the machine which both you and your customer can see.

The flanges for the oil cylinder may be made of brass grooved to fit the glass cylinder.

The flanges should be about $1\frac{1}{2}$ inches larger in diameter than the glass, which permits room for bolts to be inserted through the flanges on the outside of the glass. The thermometer is also mounted in the flanges on the outside of the glass. The glass cylinder may be obtained from any marine supply house and should be large enough to hold one pint of liquid.

The balance of the equipment needs no further explaining other than given in Fig. 1.

Using Carbon Tetrachloride

CARBON tetrachloride is probably one of the best and most frequently used solvents for cleaning refrigerating systems, but due to the fact that it is a solvent for many materials, care must be exercised in its use.

One of the materials which it will dissolve is Neoprene, a product used as a sealing medium in several parts of the system. Neoprene is used quite extensively in compressor shaft seals and some refrigerant controls such as expansion valves, pressure relief valves and constant pressure valves. It is also used as a gasket material occasionally in compressor heads.

When carbon tet comes in contact with Neoprene, the effect on it is much the same as oil on rubber. The Neoprene swells up and becomes soft. Before washing parts with carbon tet it is advisable to remove any Neoprene gaskets or be prepared to replace them before repairs are completed.



F. A. Hughler
Pennsylvania

Please do not fail to continue my subscription to your most valued periodical. Find the paper interesting and concisely written.

REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.



Heigh-Ho! Heigh-Ho! To Chicago We Must Go—

To the Sixth Annual Convention on Jan. 15-18

YES! and with just as much easy, rhythmic regimentation as the title suggests you will find unfolded for you one of the greatest three-day programs of education and entertainment ever offered.

All points of interest are centering on the Stevens Hotel where on January 15 the Refrigeration Service Engineers Society will open its Sixth Annual Convention. Committees under the able leadership of E. A. Plesskott have been hard at work for some time and are now putting the finishing touches to plans which will assure you of an extremely profitable visit.

Every one interested in the refrigeration industry, whether a member or not, is urged to attend this convention. Let nothing short of a broken leg prevent you from being there.

You Will Like It Too

With the first cock's crow on Monday, January 15, the curtain will rise on the 6th Annual Convention. These first early hours until 10 a.m. will be devoted to registration and then the first meeting will be called. After you have seen the impressive list of outstanding speakers and the topics to appear during these meetings you will agree that we have something to crow about. Among the topics selected which will provide you with much valuable information are:

"Preservation of Meat Products," temperatures that should be maintained, required humidity, rate of air movement, designs, engineering and installation problems, service and a complete discussion on the changing conditions and problems of the meat retailer.



The knowledge you will gain can be turned to dollars when you return home

The discussion on this entire subject will be presented by a man who has devoted the greater part of his business career to the problems of the meat packer and retailer. He is an outstanding design engineer and is thoroughly familiar with the problems of the service engineer.

"Engineered Air Distribution" is a talk illustrated through the use of projected pictures which will keep you spellbound for



CLAUDE A. BRUNTON
Huntington, W. Va.
President



G. A. BURNS, Toronto, Can.
First Vice-president



E. A. PLESSKOTT, St. Louis
Second Vice-president

about one hour. It will show how air can be made to go where and do exactly what you want it to do in any enclosed space. The subject will be presented by a man of unequalled excellence in the presentation of educational subjects and one who is accustomed to dealing with the service organization.

"History and development of the Soda Fountain"—a specialized subject of which so few of us have more than a bare working knowledge. The design, operation, faults and remedies of each soda fountain from the first one manufactured to the improved models of today will be explained. The speaker is one who has spent many years in the servicing and the management of a service department on these fixtures. His manner of presentation is most interesting.

In addition to these, there will be a practical demonstration of a unique method of drying refrigerating systems; a movie showing the amazing results obtained when fighting the most hazardous fires with the aid of refrigeration; and several other interesting subjects which you will find listed in the program appearing in this issue.

Joint Meeting with A.S.R.E.

An additional educational session will be provided this year through the joint meeting of the American Society of Refrigerating Engineers and the R.S.E.S. Two speakers who will present topics of interest to both societies will appear at this session and the National Championship tube bending contest will be sponsored by the Imperial Brass Manufacturing Company.



R. L. DARBY
Long Beach, Calif.
Member, Board of Directors



C. BUSCHKOPF
Beaver Dam, Wis.
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S. A. LEITNER, Kansas City
National Treasurer



H. T. McDERMOTT, Chicago
National Secretary



E. V. BLACK, Uniontown, Pa.
Sergeant-at-Arms

Entertainment

The All-Industry banquet will be held at 6:30 p.m. Tuesday, January 16. Several acts of entertainment will be provided for your amusement following the banquet and a nationally known orchestra will provide the music for dancing.

An R.S.E.S. Farewell Party will be held on Wednesday evening, January 17th. It will be one of those enjoyable informal affairs where you will have the opportunity of becoming socially acquainted with your fellow members.

The ladies of course are invited to attend these entertainments. In addition, a ladies committee is making all arrangements for the entertainment of their visitors during each day and from all indications they are going to be kept well occupied.

The tentative schedule of events as drawn

up by the convention committee, but not including the ladies' entertainments, follows:

Monday, Jan. 15th

- 8:00 a.m. to 10:00 a.m.—Registration
- 10:00 a.m. Convention Call to Order—Invocation
- 10:15 a.m. Chicago Welcomes You
- 10:30 a.m. Theme of Convention
Greetings from Manufacturers Assn.
- 10:45 a.m. Introduction of National Officers
Address by President C. A. Brunton
- Secretary's Report—H. T. McDermott
- Treasurer's Report—S. A. Leitner
- 11:15 a.m. Committee Reports:
Educational Committee
Membership Committee



WILLIS STAFFORD, Aurora,
Ill.
Member, Board of Directors



DON B. SCHUSTER, Buffalo,
N. Y.
Member, Board of Directors



GEORGE H. CLARK, Chairman
National Educational and
Examining Board

11:45 a.m. Appointment of Convention Committees
Announcements
Adjournment

Tuesday, Jan. 16th

9:45 a.m. Information Please
10:00 a.m. Proper oil charge for Commercial Systems—Illustrated
10:30 a.m. Dehydration of Refrigerating Equipment and Systems—Practical Demonstration
11:00 a.m. Movie—Refrigeration for Fire Fighting
11:30 a.m. Preservation of Meat Products
12:00 m. Report of Nominating Committee
Election of Officers
Adjournment
6:30 p.m. All-Industry Banquet

Wednesday, Jan. 17th

9:45 a.m. Information Please

10:00 a.m. The History and Development of the Soda Fountain

10:30 a.m. Applications of the Superheat Control

11:00 a.m. Movies (Title not known)

11:30 a.m. Engineered Air Distribution—Illustrated

12:00 m. Reports of Convention Committees

Unfinished Business

New Business

Adjournment

2:30 p.m. Joint Meeting with A.S.R.E.

Pressure Drop in Lines—By E. Gygax

Charging Domestic Units—West-inghouse Engineer

Tube Bending Contest—Imperial Brass Mfg. Company

8:30 p.m. R.S.E.S. Farewell Party

Largest Exhibit of Refrigeration Products Ever Assembled Under One Roof

THE Refrigeration Service Engineers Society and six other associations will hold their annual meetings in conjunction with the Second All-Industry Refrigeration and Air Conditioning Exhibition. The attendance therefore will be large and will represent almost every branch of the industry. This will be your opportunity to meet and talk with the men who are responsible for the design, manufacture, distribution and sale of the equipment you service.

Because of the large attendance expected, you are urged to make your hotel reservations early if you wish to stay at the Stevens. Other hotels nearby, of course, will have ample space available.

About 150 exhibit spaces were provided for in the plan of the exhibit hall and these spaces to date are all reserved. Arrangements are now being made to open additional space in the lower lobby near the registration headquarters.

This exhibit represents one of the finest educational features of the entire show. It gives you an opportunity to see and learn of the latest developments in refrigerating equipment and to see the latest methods employed in the service and installation field.

For your convenience the latest list of ex-

hibitors and their booth numbers follows so you may be able to locate their position on the floor plan shown:

EXHIBITORS AND WHERE TO FIND THEM

Booth No.	Company
41	Acme Industries, Inc., Jackson, Mich.
2	Aerovox Corp., New Bedford, Mass.
113-114	Alco Valve Co., Inc., Maplewood, Mo.
67-68	Aluminum Co. of America, Pittsburgh, Pa.
152	Aluminum Industries, Inc., Cincinnati, Ohio
70	All-Steel-Equip Co., Aurora, Ill.
143	American Brass Co., Waterbury, Conn.
38	American Hard Rubber Co., New York, N.Y.
133	American Injector Co., Detroit, Mich.
29	American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
69	Anemostat Corp. of America, Chicago, Ill.
77-78	Ansul Chemical Co., Marinette, Wis.
113	Arcade Mfg. Co., Freeport, Ill.
82-83	Automatic Products Co., Milwaukee, Wis.
90	Bonney Forge & Tool Works, Allentown, Pa.
145-146	Brunner Mfg. Co., Utica, N. Y.
75-76	Bush Mfg. Co., Hartford, Conn.
110-111	Business News Publishing Co., Detroit, Mich.
35-36	Carrier Corp., Syracuse, N. Y.
56	Chase Brass & Copper Co., Waterbury, Conn.
30	B. H. Clark Co., DeKalb, Ill.
91	Chicago-Wilcox Mfg. Co., Chicago, Ill.
142	Commercial Coil & Refn. Co., Chicago, Ill.
1C	Convention Binder Service, Chicago, Ill.
86-87	Copeland Refn. Corp., Sidney, Ohio
55	Cornell-Dubilier Elec. Corp., South Plainfield, N. J.
71-72	Cutler-Hammer, Inc., Milwaukee, Wis.
8-9	Curtis Refrigerating Machine Co., St. Louis, Mo.

FEDDERS UNIT COOLERS

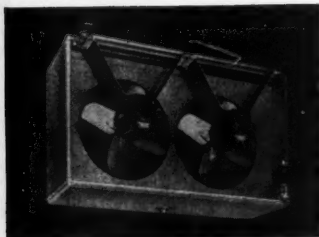
Equipped with Fedders Thermostat Expansion Valve

... Ready to Install as a "Turn Key" Unit

FOR STANDARD REFRIGERATION AND COMFORT COOLING



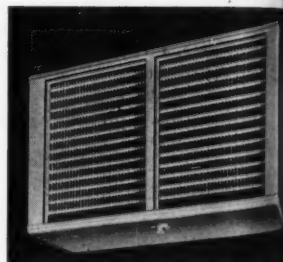
Fedders Series 73
Single Unit Cooler



Showing rear view of Fedders Series 73
Twin Unit Cooler

Fedders Series 73 Unit Coolers are built in a complete range of sizes in single and twin models for uniform cooling of walk-in coolers, storage rooms, beer keg storage rooms, etc. Built-in Fedders Thermostatic Expansion Valve, motor and fan provide a complete "package unit" ready to connect up for refrigeration or for inexpensive comfort cooling in offices, stores, restaurants and other similar places. Stream-line designed cabinets are rust-proofed to assure permanent attractiveness.

FOR LOW TEMPERATURE REFRIGERATION



Front view of Fedders Series 732 Twin Unit Cooler for low temperature refrigeration. Available also in single models.

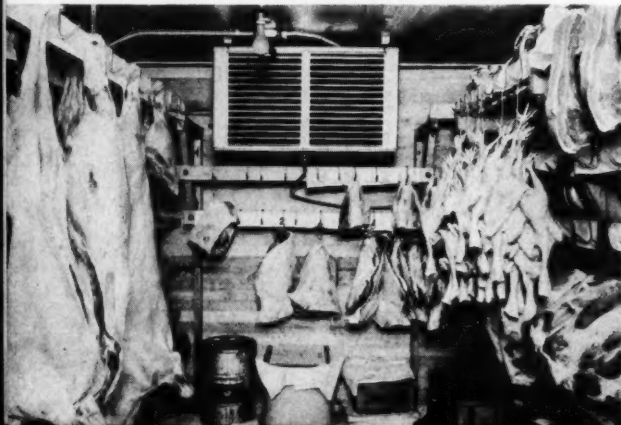
FEDDERS MANUFACTURING COMPANY BUFFALO, NEW YORK

Atlanta
Boston
Chicago

Export Distributor: Melchior, Inc., Des Moines, Iowa

Typical Installation Pictures of Fedders Unit Coolers

Showing compact installation of Fedders Series 73 Twin Unit Cooler in large walk-in meat cooler. Ideal relative humidity prevents excessive food waste from drying, shrinking and discoloration.



Below: Fedders Series 732 Low Temperature Unit Coolers in storage vaults, apple storage and other installations.



RS fit in Complete Sizes and Capacities stat Expansion Valves... Motors... Fans a "PACKAGE UNIT"

LOW TEMPERATURE COMMERCIAL REFRIGERATION

Fedders Series 732 Unit Coolers have cooling coils especially designed for low temperature cooling in lockers, apple storage rooms, fur storage vaults and other low temperature installations. Vertical arrangement of fins provides quick drainage of condensate during defrosting. Insulation eliminates accumulation of condensate on outside of cabinet.

732 Twin
refrigeration
models.

Write for Data Bulletins

MANUFACTURING CO.
FALCON NEW YORK

Calif.
New York
Philadelphia
Los Angeles
Melchior, Inc., Dessau Co., New York, N. Y.

FOR SPACE SAVING IN SMALL COOLERS

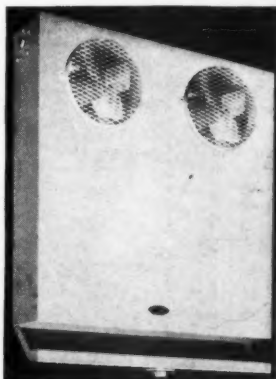
Fedders Wall Type Unit Coolers are built in single and twin models to provide a wide range

of capacities. Compact size and self-contained design simplify installation and leave maximum space available for shelves and food storage in various types of refrigerators and cases. Rugged cabinets are rust-proofed and finished



Model 153

in white, baked-on, easy to clean enamel.



Model 253

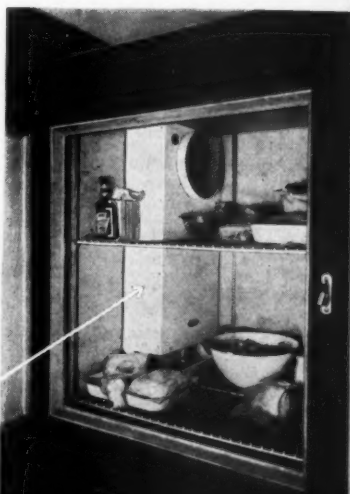
es of FEDDERS Coolers In Action!!!

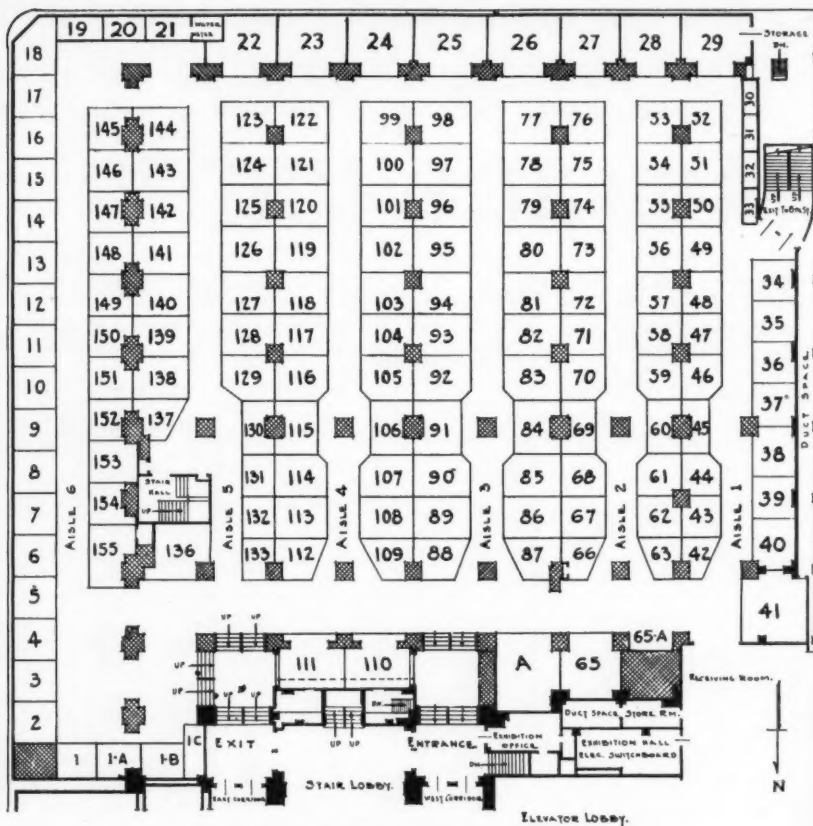
732 Low temperature Unit Cooler for use in fur storage and other similar low temperature

Close-up of storage box with door open shows how compactly Fedders Model 153 Wall-Type Unit Cooler fits into corner. Note the baked-on white enamel finish that's easy to clean.

Visit

Fedders Booths
15 and 16 at the 2nd
Annual All-Industry
Exposition,
Stevens Hotel,
Chicago, January
15-18, 1940.



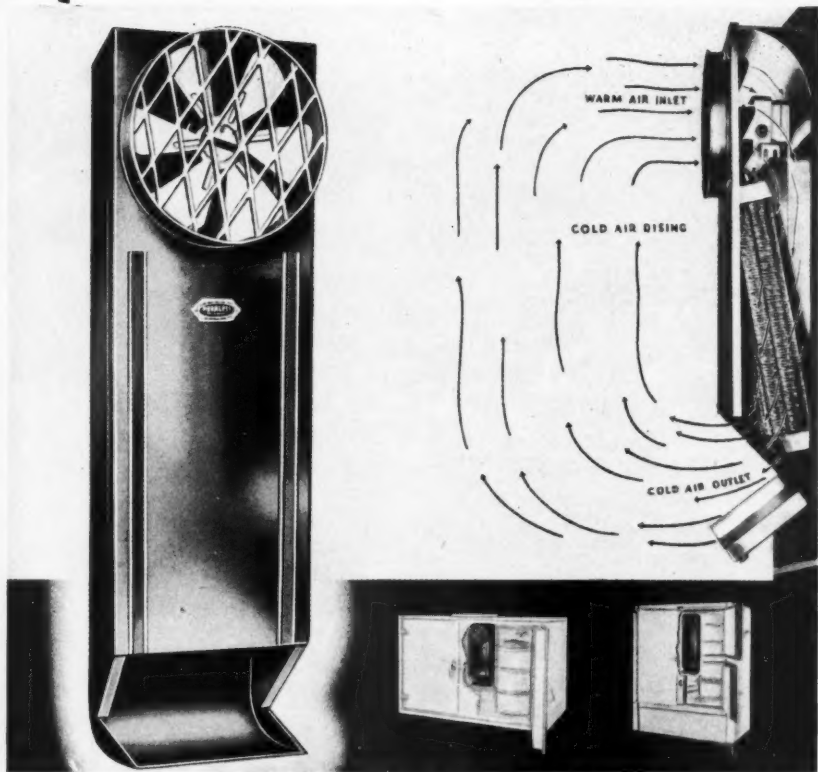


FLOOR PLAN OF THE ORIGINAL EXHIBIT SPACE

Booth No.	Company
22	Day & Night Water Heater Co., Los Angeles, Calif.
144	Dayton Rubber Mfg. Co., Dayton, Ohio
136	Deissler Machine Co., Greenville, Pa.
86-89	Detroit Lubricator Co., Chicago, Ill.
84-85	Dole Refrigerating Co., Chicago, Ill.
102	E. I. duPont de Nemours Co., Wilmington, Dela.
130	Durabilt Steel Locker Co., Aurora, Ill.
99	Duro Metal Products Co., Chicago, Ill.
116	Electrimatic Corp., Chicago, Ill.
45	Evers Hardware Co., Denton, Texas
15-16	Fedders Mfg. Co., Inc., Buffalo, N. Y.
115	Gale Products, Galesburg, Ill.
48	Gates Rubber Co., Denver, Colo.
17	General Controls Co., Glendale, Calif.
93-94	General Electric Co., Cleveland, Ohio
51-52	General Electric Co., Schenectady, N. Y.
109	L. H. Gilmer Co., Tacony, Philadelphia, Pa.
3	W. A. Hammond Drierite Co., Yellow Springs, Ohio
65	Heating & Ventilating, Chicago, Ill.
103-104	Henry Valve Co., Chicago, Ill.
112	Howe Ice Machine Co., Chicago, Ill.

Booth No.	Company
57	Ideal Beer Cooler, St. Louis, Mo.
37	Imperial Brass Co., Chicago, Ill.
44	Insto Gas Co., Detroit, Mich.
1A	Jarrow Products Corp., Chicago, Ill.
53	Jewett Refrigerator Co., Inc., Buffalo, N. Y.
37	Kason Hardware Co., Brooklyn, N. Y.
58-59	Kelvinator Division, Nash-Kelvinator Corp., Detroit, Mich.
97-98	Kerotest Mfg. Co., Pittsburgh, Pa.
10-11	Kold-Hold Mfg. Co., Lansing, Mich.
154-155	Marlo Coil Co., St. Louis, Mo.
119	Jas. P. Marsh Corp., Chicago, Ill.
47	Master Refrigerated Locker Systems, Inc., Sioux City, Iowa.
49-50	McCord Radiator & Mfg. Co., Detroit, Mich.
129	McIntire Connector Co., Newark, N. J.
66	Mercoid Corp., Chicago, Ill.
20-21	Midwest Mfg. Co., Galesburg, Ill.
137-138	Mills Novelty Co., Chicago, Ill.
61	Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
4-5-6	Modern Equipment Corp., Defiance, Ohio
117-118	Mueller Brass Co., Pt. Huron, Mich.
46	E. B. Muzzarelli & Co., Kansas City, Mo.

Upside Down COOLING



PEERLESS Gun Cooler

A NEW Type of Cooling

COLD AIR cascades from the BOTTOM of the PEERLESS GUN COOLER

WARM AIR is drawn off the top of the fixture

COOLED AIR ascends VERTICALLY through the Products Stored

A NEW METHOD with NEW RESULTS

Uniform temperatures ALL OVER the Fixture

HIGH HUMIDITY—NO FOOD Shrinkage

And it's PACKAGED Refrigeration . . . made for every type of fixture

. . . ready and easy to install . . . Capacities 1200 to 12000 B.T.U.'s per Hour.

PEERLESS GUN COOLERS MAKE MORE MONEY FOR YOU!



Packaged Refrigeration

PEERLESS OF AMERICA, INC.

MIDWEST FACTORY, GENERAL OFFICES—515 W. 35TH STREET, CHICAGO

NEW YORK FACTORY PACIFIC COAST FACTORY SOUTHWEST FACTORY EXPORT DIVISION
43-20 34TH STREET 3000 SOUTH MAIN ST. 2218 N. HARWOOD ST. P. O. BOX 636
LONG ISLAND CITY LOS ANGELES, CALIF. DALLAS, TEXAS DETROIT, MICH

Booth No.	Company
A	Refrigeration Service Engineer, Chicago, Ill.
7	Pacific Lumber Co., Chicago, Ill.
123-124	Peerless of America, Inc., Chicago, Ill.
95-96	Penn Electric Switch Co., Goshen, Ind.
81	Perfection Refrigeration Parts Co., Harvey, Ill.
18-19	Perlick Brass Co., Milwaukee, Wis.
34	H. A. Phillips & Co., Chicago, Ill.
92	Portable Elevator Mfg. Co., Bloomington, Ill.
106-107	Ranco, Inc., Columbus, Ohio
74	Refrigerating Engineering, New York, N. Y.
54	Refrigerating Specialties Co., Chicago, Ill.
25-26	Refrigeration Appliances, Inc., Chicago, Ill.
60	Rempe Co., Chicago, Ill.
153	Rotary Seal Co., Chicago, Ill.
23	Sanders Butcher Supply Co., Detroit, Mich.
65A	Scientific Laboratories, Cincinnati, Ohio
39-40	Servel, Inc., Evansville, Ind.
151	South Bend Lathe Works, South Bend, Ind.
73	Spoecher-Lange Co., St. Louis, Mo.
147-148	Square D Co., Detroit, Mich.
126	Superior Valve & Fittings Co., Pittsburgh, Pa.
127-128	Tecumseh Products Corp., Tecumseh, Mich.
100	Temprite Products Corp., Detroit, Mich.
121	Texas Co., Chicago, Ill.
62	Tyler Fixture Corp., Niles, Mich.
79	Utilities Engineering Institute, Chicago, Ill.
131-132	Universal Cooler Corp., Detroit, Mich.
105	Van Cleef Brothers, Chicago, Ill.
120	Victor Mfg. & Gasket Co., Chicago, Ill.
108	Virginia Smelting Co., West Norfolk, Va.
14	Wagner Electric Corp., Chicago, Ill.
149-150	Weatherhead Co., Cleveland, Ohio
63	White-Rodgers Electric Co., St. Louis, Mo.
122	Williams Oil-O-Matic Heating Corp., Bloomington, Ill.
80	Wolverine Tube Co., Detroit, Mich.
101	Zenith Carburetor Div., Bendix Aviation Corp., Detroit, Mich.

THE CHAMPIONSHIP TUBE BENDING CONTEST

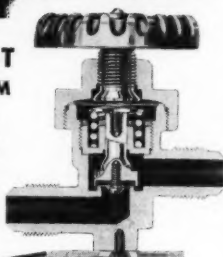
ONE of the features of the joint meeting between the A.S.R.E. and R.S.E.S. on Wednesday afternoon, January 17, will be a tube bending contest, conducted by The Imperial Brass Manufacturing Co.

The contest will be a contest of champions for the purpose of declaring a national champion. Each chapter, that has in the past year declared one, is urged to send its champion tube bender as their representative to enter this contest. If, for some reason, the champion is not available, send an alternate. Contestants are requested to bring their own tools and to notify the Imperial Brass Manufacturing Co., at the earliest possible date of their intention to compete. Tools needed will be a tube cutter, flaring tool, and bending tool's; tubing, fittings, and rules will be supplied. There will be prizes for all contestants with special prizes for the winners.

14 FEATURES

that illustrate
KEROTEST'S
PROGRESSIVE DESIGN AND
FINE CRAFTSMANSHIP

KEROTEST DIAPHRAGM PACKLESS VALVES



1. Accessible Hex Wrench hold.
2. Cap Stem and Handwheel may be removed as a unit.
3. Radius in Forged Brass Cap fully supports Diaphragms when stem is in full open position.
4. Metal Seal of Cap, Diaphragms and Body.
5. Stainless Steel Spring reciprocating movement of Handwheel.
6. Unrestricted Openings equal to inside diameter of Tubing.
7. Rigidly attached with case hardened Phillips Recessed Screws.
8. Easy Grip Handwheel securely fastened to Stem.
9. Positive Metal Seal when Stem is in full open position.
10. 4 Metal Diaphragms replaceable with valve under pressure.
11. Pressure-tested metal-to-metal Backseat when Stem is in full open position.
12. Replaceable flat composition seat insert.
13. Raised Body Seat assuring ease of operation and positive seal.
14. Heavy steel 4 Hole Mounting Flange, cadmium plated.

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THE ALL-INDUSTRY BANQUET ON TUESDAY, JANUARY 16TH

THE All-Industry Banquet to be held Tuesday evening, January 16th, will be remembered long after it is over as the most outstanding social event of the year within the entire refrigeration industry. It will be



M. W. KNIGHT
Chairman, R.E.M.A. Exhibit Committee

the one big event of the show from January 15th to 18th in which all attending groups and societies will participate, with but one thought in mind—that of dining and being entertained in an atmosphere of complete relaxation, fun and good-fellowship.



J. S. FORBES
President, R.E.M.A.

The All-Industry General Committee is sparing no expense in its plans for the evening, and according to Mr. M. W. Knight (Peerless of America, Inc.) who is chairman of the Committee, the lid is off the

cash box. The best obtainable is none too good for this affair. The festivities will be called to order at 6:30 p.m. and will begin with a full course dinner which will be designed to satisfy the most fastidious inner man. If you are among those who have had the opportunity of partaking of the masterful dinners produced by the Stevens Hotel chefs your mouth will begin watering at this mere mention.

Organ music, community singing and a nationally-known orchestra frequently heard on radio programs will supply entertainment while you dine. Following the dinner there will be a few introductions of personages you will want to know, but there will be no speakers. The entire evening is to be devoted to fun and entertainment and time will not permit the inclusion of speeches.

Within a very few minutes after your dinner is over you may sit back and allow it to digest while being entertained by one-and-one-half hours of the best floor show that radio, stage and screen can produce.

A Master of Ceremonies will take charge of the evening at this point. The floor show will include vaudeville acts from local theatres, musical comedy, acrobatics, follies and scandal shows, dance teams, humor, juggling acts and singers of national renown. Yes, it will be an all star show—one that cannot be topped anywhere you go.

It will probably be getting late by the time the show is over, but no one will want to go to bed after such an exhilarating evening of fun, so dancing to the music of an orchestra that will inspire rhythm in the feet of even the most laggardly dancer will be in order for the balance of the evening.

§ § §

PLANS FOR LADIES' ENTERTAINMENT

FOR the past several weeks there has been feverish activity around the headquarters of the Ladies' General Convention Committee. More than a dozen ladies—members of this Committee—under the able leadership of Mrs. M. W. Knight are formulating plans and completing arrangements for the finest program obtainable with which to entertain visiting ladies at the All-Industry Refrigeration and Air Conditioning Exhibition in Chicago, January 15th to 18th.

Through Mrs. C. A. Brunton, national president of the R.S.E.S. Ladies' Auxiliary, five ladies were appointed to the R.S.E.S. Ladies' Committee. They are: Mrs. E.



Chieftain

INVITES ALL R.S.E.S. MEMBERS

IN ATTENDANCE AT THE 6th ANNUAL CONVENTION AND
2nd ALL INDUSTRY EXHIBIT TO VISIT OUR BOOTHS

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CHIEFTAIN Replacement Compressors and Condensing units.

✓ **SEE OUR DISPLAY**—of new commercial models, heavy
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such as balanced reciprocating parts and forced feed
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White, Calumet City, Ill.; Mrs. P. Krueger, Chicago; Mrs. W. Stafford, Aurora; Mrs. F. Duvall, Chicago; Mrs. O. Armstrong, Chicago. The first three of those appointed were designated as a co-ordinating committee to work with Mrs. Knight and her General Committee.

The General Committee, in addition to the three ladies mentioned consists of Mrs. R. H. Luscombe, Mrs. D. H. Daskal, Mrs. I. Alter, Mrs. J. B. McGuan, Mrs. H. W. Blythe, Mrs. D. Perham, Mrs. T. C. McKee and Mrs. A. B. Stickney.

During recent meetings of these committees the tentative program of events has been outlined and while this program is still subject to change here are some of the interesting highlights to be considered: A tour through the retail store of Marshall Field and Co., one of the world's finest department stores, and a trip which no doubt would be enjoyed as much by Chicagoans as the out-of-towners; an interesting tour through The Cradle at Evanston, Illinois—the nationally-known original home of babies adopted by your favorite screen stars and others; a visit to one of the Broadcasting Studios which will give you an opportunity of seeing at first-hand the source of your

evening's entertainment; a tour through the mammoth Stevens Hotel—the world's largest—which might well be termed "a city within a city"; a visit to one of Chicago's large industrial plants; and for both men and ladies a conducted tour through Chicago's world-famous Stockyards.

Don't Forget the Banquet

Of course, in addition to the outline given, which is a program exclusively for the ladies, there is the All-Industry Banquet to be held on Tuesday evening which is being planned as much for the ladies as all other visitors present.

The ladies are also invited to a party to be held on Wednesday evening, conducted by the Refrigeration Service Engineers Society, which will take the form of an informal get-together including entertainment and dancing.

For those ladies who are interested in taking advantage of this occasion to do personal shopping in the famous Chicago loop, ample time outside of that required for the ladies' program will be provided for such tours. The Ladies' Committees on hand and the facilities offered by the hotel will provide you with all the information you require



Views of the Illinois State Association second annual meeting at Rockford, Ill., held Nov. 4 and 5. Pictures were taken by Mr. Irving Alter of the Harry Alter Co.

CHECK WEATHERHEAD FIRST

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VALVES—Cut squarely from extruded brass for streamlined compactness. Receiver tank, flange compressor, angle shut off; two and three way shut off.

FILTERS—sight glass liquid line filters showing condition of filter agent; also sight glass liquid line indicators.

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All shapes and sizes.

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DEHYDRATORS—FILTERS—NEUTRALIZERS—STRAINERS
OF ADVANCED DESIGN AND CONSTRUCTION

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regarding means of transportation and location of shopping areas you may be interested in.

All attending ladies are urged to register with the Ladies' Greeting Committee in the Registration Hall immediately on arrival, at which time each will be furnished with a complete program of all events scheduled, and arrangements made to acquaint them with other visiting ladies.

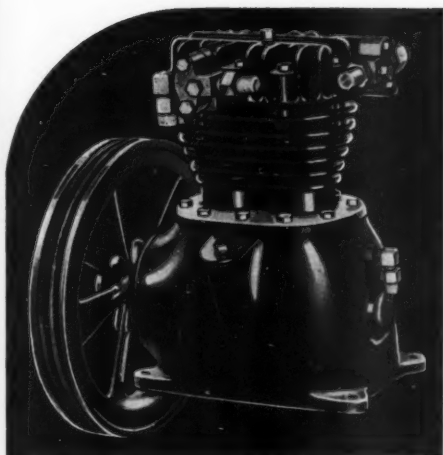


NEW CHAPTER IN NEW YORK

ON Thursday evening, November 30th, the refrigeration service men of eastern New York state met in Schenectady to consider the organization of a local chapter of the R.S.E.S.

A formal petition for a charter was filed in by twenty-four of the men present, and the chapter will be known as the Hudson-Mohawk Chapter. The following officers were elected: *President-Treasurer*, George B. Gardner; *1st Vice-President*, E. J. Walters; *2nd Vice-President*, Leo Helmbold; *Secretary*, S. Rogers Pitman; *Sergeant-at-arms*, Harold C. Bailey.

The date for the next meeting has not yet been set, but all those present at this meeting will be notified of any coming meetings, and any other service men in the vicinity who may be interested are invited to get in touch with Mr. George B. Gardner at 1716 Campbell Ave., Schenectady, or Mr. Leo Helmbold at 22 Shufeldt St., Kingston, N. Y., to ascertain when and where future meetings will be held. It was suggested the next meeting be a get-acquainted meeting with refreshments and entertainment.



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For **PEAK PERFORMANCE**

COMPRESSOR UNITS

One of the PAR features that appeal to dealers and service men is the simplicity of this powerful equipment. In addition, it is sturdy—built to take the severest operating conditions in its stride—without fuss or bother. Capacities are large in all PAR Units; these precision-made, slow speed compressors are noted for long life and reduced servicing costs.

- *Large displacement—slow speed. Three-ring pistons (Cylinders diamond-bored and honed). Hardened crankshaft.*
- *Removable valve plate. Finned head and cylinders. Fan spoke, balanced flywheels. Bullseye oil gauge. Crankcase drain plug.*

PAR Compressor Units (2-cylinder model shown) are made in six sizes for various applications. The PAR Line also includes 28 models of complete highsides.

Send for **FREE CATALOG**
or see PAR units on display at your jobbers.



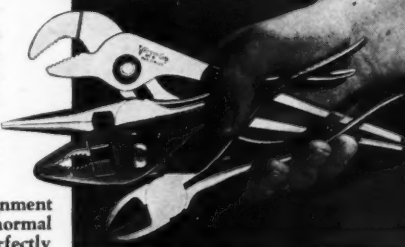
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Equip yourself for all 'round gripping and cutting service . . . with these four patterns. Built to make work easier on any plier job, they will satisfy you with their fine construction and the dollars-and-cents economy their long working life gives you.

Cutting edges hand-filed to perfect alignment . . . sharp, deep-milled teeth grip with normal hand pressure . . . joints perfectly machined to eliminate wobble and minimize wear . . . patented vacuum-grip pattern handles for non-slip grip . . . **AND Snap-on Vacuum-Grip Pliers are tempered all the way through and not**



No. 9—Heavy-Duty Gripping Pliers
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simply surface hardened. See your Snap-on salesman or write for catalog.

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Socket Wrenches

*The Choice of
Better Mechanics*

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HERMAN GOLDBERG'S ANNUAL CHRISTMAS PARTY

HERMAN GOLDBERG'S annual Christmas parties, which are usually held on the 19th of December, have now become



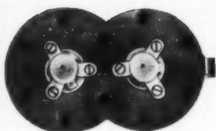
HERMAN GOLDBERG

recognized as a pleasant rendezvous each year for all the men and women connected with the refrigeration industry in and around Chicago.

Again this season, Herman has made arrangements to have this affair in the beautiful North Ballroom of the Stevens Hotel on the customary December 19th. The fun starts at 8:30 in the evening.

The party this year will be more entertaining than ever before and should appeal to every individual present as there will not only be a national network orchestra, but also several well-known vaudeville acts of stage and screen who will perform at various intervals during the evening. What's more, arrangements have already been made for contests and games. Many valuable prizes and a barrel of fun are in store for the lucky contestants.

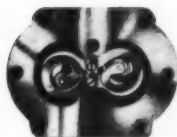
Herman Goldberg, as everybody in the refrigeration industry knows, worked diligently in the Chicago Chapter of the R. S. E. S. and helped to build that organization when it was very young. He often acted as chairman at the many successful affairs which made the R. S. E. S. grow. According to Herman, the Christmas parties are a continuation of the work which he contributed to the R. S. E. S. As a matter of fact, December 19th is now the accepted date of the pre-convention parties and the boys don't want to miss it.



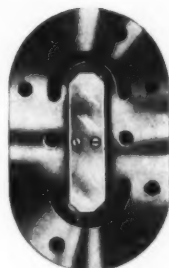
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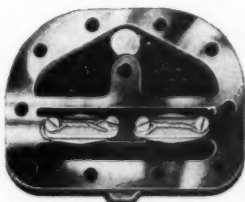
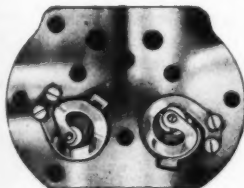
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Pure refrigerant and oil are tremendously stable under normal conditions. The amounts of moisture which give trouble in a properly installed and serviced system are small. THAWZONE, because it acts chemically, is required in only small amounts to eliminate this moisture, leaving substantially pure oil and refrigerant. Simple, isn't it? A little goes a long way. Try it NOW!

Fully protected by U. S. Patents. At leading jobbers everywhere

THAWZONE

HIGHSIDE CHEMICALS CO., NEWARK, N. J.

FIRE DESTROYS STOCK OF NEON RADIO ELEC. CO.

A FIRE broke out at 4:30 a.m., October 3rd, in the building occupied by the Neon Radio Electric Co., owned by Mr. James W. Cargil.

Mr. Cargil, who is a member of the Western Massachusetts Chapter of the Refrigeration Service Engineers Society, states that damage to his stock and equipment amounted to over \$2,500. While there was some insurance on the building, there was none on its contents.

There was an explosion preceding the fire, followed by a spreading of chlorine gas. The origin of the fire has not been determined. Damaged equipment belonging to James Cargil included refrigerators, radios, batteries, radio supplies and machinery used in repair work.

§ § §

INTERNATIONAL MEETING AT HAMILTON, ONT.

MR. GORDON A. BURNS, *National 1st Vice-President*, reported recently on what was probably the first international

meeting of the chapters outside of the national conventions.

The meeting was held under the direction of the Ontario Maple Leaf Chapter on November 10, in Hamilton, Ontario. The Hosts of the evening were Kelvinator of Canada Limited, and Mr. Graff of Ranco Inc. was the guest speaker. Mr. L. Bouchier of the Mount Royal Chapter was a visiting member and two carloads of members from the Niagara Frontier Chapter, including Mr. O'Hara, *President*, and Mr. Szyzkowski, *Secretary*, were present. A large turn out from the Ontario Forest City Chapter and the Ontario Maple Leaf Chapter swelled the meeting to one of unusually large proportions.

§ § §

DEFINITION

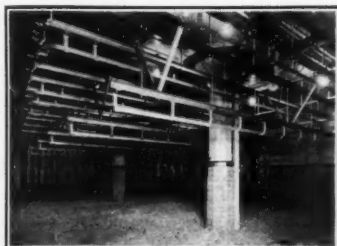
Boy: "Say, Dad, what does it mean when the paper says some man went to a convention as a delegate-at-large?"

Dad: "It means his wife didn't go with him, son."

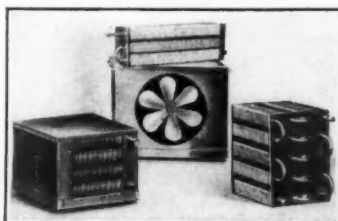
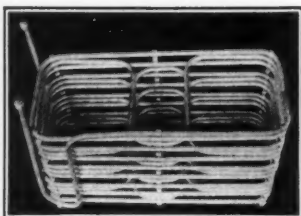
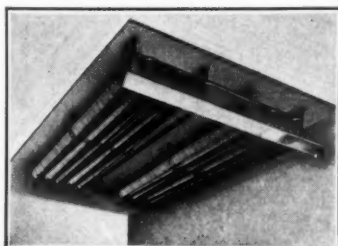
Wendell G. Osterhoudt
Nebraska

We believe you have a real magazine.

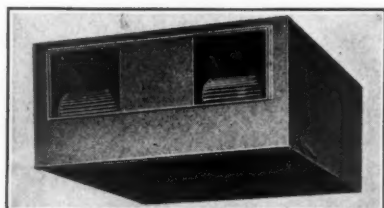
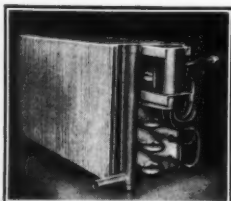
RECOY PRODUCTS



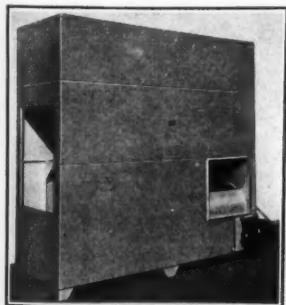
RECOY DOWN DRAFT SYSTEM FOR LARGE OR SMALL ROOMS



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Refrigeration & Air Conditioning

Continuous Tubing—No Joints—No Solder

Copper—Aluminum—Steel

Evaporative Condensers

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Special Apparatus to Your Design

REFRIGERATION ECONOMICS CO.
INCORPORATED

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JUST OUT • A NEW BOOK • THE FIRST EVER PUBLISHED

Here is an
authoritative guide for
every owner and operator of
a refrigerated locker
storage plant

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THIS new book is specifically designed to furnish practical answers to problems that arise in locker plant operation every day.

It brings home to the locker plant manager and operator sufficient facts to cause him to realize the scope of knowledge he must possess in order to fully and profitably serve his plant and community.

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The book is factual—it is comprehensive in its description of the various steps in a successful locker plant operation. This is a book every plant manager and operator will find most helpful. It is an operator's book in every sense of the word. A valuable guide to check your individual operation—and most important, based on accepted practice and experience. Many plants will want more than one book.

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VIEWS OF THE WISCONSIN STATE ASSOCIATION PICNIC

The second annual picnic of the Wisconsin State Association enjoyed an attendance of over 150 this year and a new high in success. Attendants came from all parts of Wisconsin and Northern Illinois. The main event of the day was a baseball game between the Madison and Rockford Chapters. Other events included games, races and contests. Much of the success of the day is credited to the cooperation of the following companies: Henry Valve Co., Rotary Seal Co., Dayton Rubber Mfg. Co., Wagner Electric Corp., Minneapolis-Honeywell Regulator Co., James P. Marsh Co., Dole Refrigeration Co., Imperial Brass Manufacturing Co., Chase Brass Co., Automatic Products Co., Kerotest Manufacturing Co., Bonney Forge and Tools, Taylor Instrument Corp., and Gustave A. Larson Co.

WE'LL ALL BE THERE

2nd Annual All-Industry
Refrigeration and
Air-Conditioning Exhibition
STEVENS HOTEL • CHICAGO • JANUARY 15-18



● It's been a long time since the first all-industry exhibition in Chicago last year. The Ansul Twins—and our Youngest, too—are looking forward to seeing you again. You'll be glad to know they're the same boys they have always been—clean, pure, dry!

ANSUL SULPHUR DIOXIDE
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ICE-X

ANSUL CHEMICAL COMPANY, MARINETTE, WIS.

Chapter Notes

Under this heading will appear news of the chapter meetings. For names of the officers and dates of regular meeting nights, please refer to the Chapter Directory.

WICHITA CHAPTER

November 17th—The meeting was called to order and the usual business conducted, after which a discussion of the individual problems of those present took place. Many helpful suggestions were brought out through this discussion. One new member, Mr. Merle K. Hawkins, was welcomed to the chapter.

CANADIAN CAPITAL CHAPTER

November 6th—The second meeting of the chapter was held in Albion Hall and after a short business session Mr. Milliken, Educational Chairman, addressed the meeting and outlined arrangements he intended to make for the educational program covering future meetings. Mr. J. Bellamy was introduced and spoke on the subject of electric motors and their operation. The evening prize donated by President Pinke was won by Mr. Hilton Arthur.

November 17th—The meeting was called to order at the usual time and additional signatures were secured for the petition for a charter. Arrangements for a dinner to be held in conjunction with the next meeting were discussed by President Pinke.

At this meeting it was announced there will be a discussion on motors by a representative from the Wagner Electric Co. The meeting was then turned over to Mr. Milliken, Chairman of the Educational Committee, who spoke on the relation of temperatures and pressures. He was followed by Mr. Jones, Chairman of the Membership Committee, who discussed various types of gases. A door prize consisting of a flaring tool, donated by the Refrigeration Supplies Co., of London, Ontario, was drawn by Mr. Herbst and won by Mr. Eddy Hill.

WORCESTER CHAPTER

November 13th—The annual election of officers was held during this meeting with the results that the following were appointed to serve for the coming year: *President*, Stuart B. Garland; *First Vice-President*, William Viner; *Second Vice-President*, Bernard Schulze; *Secretary-Treasurer*, Thomas H. Cronk; *Educational Chairman*, Frank Vachon.

It was decided at this meeting the chap-

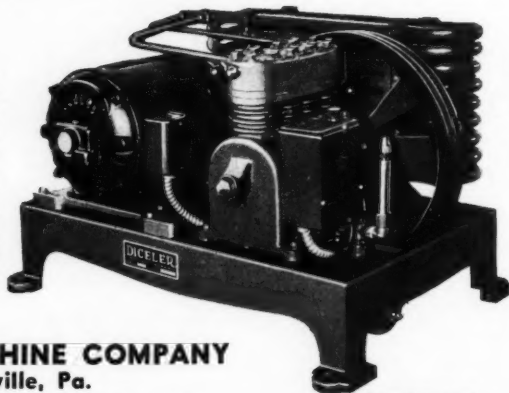
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ter will meet on the first and third Tuesday of each month and the next meeting to be held at Hotel Lenox. At the last meeting Mr. Austin Jones, of the Kerotest Manufacturing Co., was a very helpful visitor. Mr. Jones is a member of the Society in one of the western chapters and has done considerable work in helping to organize many chapters throughout the country.

ONTARIO FOREST CITY CHAPTER

October 2nd—The first meeting of the season was held in the Hotel London. The treasurer, Mr. Wright, gave a fine report explaining that ample moneys were in hand to start the coming season.

A vote was taken to elect members to fill the vacancies due to the war. Mr. C. Holmes, of Stratford, and Mr. W. Bevis, of London, were elected to the Board of Directors. Mr. Yeddeau was elected as Secretary to fill Mr. Campbell's place.

Mr. Yeddeau suggested a letter should be forwarded to the Minister of National Defence offering the services of the chapter to the Government and also to advise them of non-political views, etc. It was decided at the meeting to send the letter.

October 16th—The meeting was held in the Hotel London. The speaker on this occasion was Mr. Phillips, Chief Engineer of

Kelvinator of Canada. Mr. Phillips gave a fine presentation on the Computation of Heat Loads in a Commercial Refrigerator.

An invitation from the Ontario Maple Leaf Chapter to attend a joint meeting with the Buffalo Chapter, U.S.A., in Hamilton, Ontario, was received. A vote of thanks was sent to the Toronto Chapter and we advised that approximately twenty members would join them at Hamilton on November 10th.

November 6th—The Treasurer gave a report of the latest standing of the chapter and advised the members that the money would be forwarded to Chicago next week.

The Secretary read the reply from R. H. Norman L. Rodgers, Minister of National Defence, which was as follows: "Your letter of October 11th in which you offered the services of your Society to the Government at the present time is very much appreciated. I note what you say in regard to the part taken by the Kelvinator Company service men in England. Your communication has been placed before the appropriate officials of the department and should occasion arise where advantage can be taken of your offer, I shall feel free to call upon you." Mr. Dawson offered to have this very important letter framed so that members could hang it in their offices or shops in turn. This was done and Mr. Dawson of "Resco," received the honor of having it first.

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The speaker for the evening was Mr. Parish from the Ontario Maple Leaf Chapter. He gave an exceptional address on how to gauge the orifice size in a thermostatic expansion valve. He also gave very brief but good advice on driers.

An account of the joint meeting between the Buffalo, U.S.A., Ontario Maple Leaf (Toronto) and the Ontario Forest City (London) Chapters, which was held in Hamilton, Ontario, on November 10th, is contained on another page of this issue. This meeting was sponsored by Kelvinator Toronto Branch and Resco Company of London. They supplied the speaker, the lunch and refreshments.

ONTARIO MAPLE LEAF CHAPTER

September 22nd—The first meeting of the Ontario Maple Leaf Chapter, following the summer recess, was held at the King Edward Hotel. A resume of the summer's activities was presented by the Chairman of the Entertainment Committee which indicated a very successful round of social events.

The Educational and Entertainment Committee Chairmen outlined the proposed program for fall and winter which includes

some interesting educational speakers. The highlight for the fall session was the announcement of a joint meeting in Hamilton, Ontario, of the Niagara Frontier Chapter, the Ontario Maple Leaf Chapter and the Ontario Forest City Chapter, to be held November 10th. The meeting closed with a general discussion.

October 13th—The Ontario Maple Leaf Chapter held its second meeting of the present season at the King Edward Hotel. After a general business session Mr. Harry Anderson, Chief Engineer of Wagner Electric Company of Canada, gave a very interesting talk on electric motors. An open discussion on the subject was held following which our good friend, Mr. G. McCracken, invited the assembly to enjoy sandwiches and beer provided by the Wagner Electric Company. All present enjoyed themselves very much.

MONTGOMERY CHAPTER

October 19th—The meeting was called to order at 8 p.m., but due to the small attendance the entire evening was devoted to informal discussions of problems confronting the local service companies. These discussions, while not of an official nature, brought

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forth many helpful suggestions to those men attending the meeting.

November 3rd—This meeting was held at the Teague Hardware Company and was sponsored by the Detroit Lubricator Co. A very interesting discussion by one of the representatives of the Detroit Lubricator Co. brought forth much interesting information on valves and other devices manufactured by them. Refreshments were served following the meeting and it was the consensus of opinion of those present that this was the best meeting held to date.

BOSTON CHAPTER

November 13th—After the meeting was called to order and a short business session disposed of, the President appointed several committees to serve during the coming year. Following these appointments the Treasurer's report was given and Mr. Coffey then requested that an audit be made of the chapter accounts.

Announcement was made of plans being worked out for a joint meeting of Chapters sometime in the near future. This meeting will take the form of a state meeting in which it is hoped that many problems common to the various chapters can be worked out. Plans were also being formulated for transportation to this meeting by bus rather

than have the individual members driving their own cars.

The meeting was then turned over to Mr. Chandler of the McIntire Connector Company, who presented an interesting talk on moisture acid, and sludge in the system. This talk stimulated considerable discussion among the members.

MADISON CHAPTER

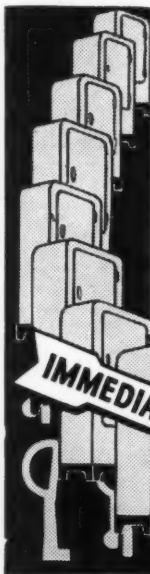
November 14th—After the meeting was called to order Mr. Buschkopf gave an outline of the convention he had attended at Rockford, Ill. He gave a concise report on the educational program presented and an interesting account of the banquet and party. Considerable information received from the national office was read concerning the Sixth Annual Convention in January and those present were urged to make plans to attend this convention.

KANSAS CITY CHAPTER

November 14th—A short business session was conducted after the opening of the meeting, but due to the fact that an interesting speaker was available for the evening and as much time as possible should be allowed to him, most of the business was dispensed with until a future date.

The meeting was turned over to Mr. An-

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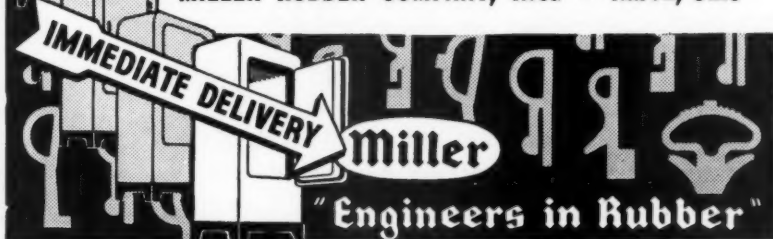


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draws, Chairman of the Educational Committee, who introduced Mr. Len Krause of the Minneapolis-Honeywell Regulator Company. Mr. Krause gave an interesting talk, aided by a practical demonstration, on controls manufactured by his company. Much valuable information was derived from this talk and it was greatly enjoyed by those present.

COLUMBUS CHAPTER

November 15th—The meeting was opened with the president, Robert C. Kaiser, Jr., presiding. A very good attendance of both members and visitors was present.

Announcement was made that at the next meeting moving pictures would be shown, together with a discussion on industrial and refrigeration belts by a representative of the Dayton Rubber Mfg. Co.

Mr. Mason, of the Refrigeration Electric Supply Co., extended an invitation to those present to attend a meeting of their company on the following Thursday. After some discussion on the subject it was decided that meeting dates of the chapter should be changed to the second and fourth Thursdays of each month.

For the educational program of the evening the entire meeting went on a conducted tour through the Rail Light Plant, after which they enjoyed refreshments presented by Mr. G. E. Graff of Ranco, Inc.

Following is the list of new officers elected for the ensuing year: *President*, R. C. Kaiser, Jr.; *Vice-President*, William F. Redd; *Secretary-Treasurer*, E. Merrill Brethauer; *Sergeant-at-arms*, John T. Gay; *Chairman of the Membership Committee*, L. H. Hulet; *Chairman of the Program Committee*, Nedford K. Mason.

ATLANTA CHAPTER

August 21st—This meeting was devoted primarily to the election of officers and after a short business session was conducted a Nominating Committee was appointed and the election of officers took place in the usual manner. Those elected were as follows: *President*, Sam Mayfield; *First Vice-President*, Charles Biggers; *Second Vice-President*, J. D. Stephen; *Secretary-Treasurer*, Henry Madden; *Sergeant-at-arms*, M. G. Ogden; *Directors*: Thomas Carnell, R. M. Graves, George W. Weldon, Wm. M. Rapp, Jr., M. G. Ogden.

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Following the election of officers a proposal was made whereby retiring presidents in the future would automatically become Chairman of the Board of Directors. The Secretary-Treasurer turned over the books to the incoming officers.

DAYTON CHAPTER

November 27th—Due to the fact that the Treasurer has changed the nature of his business which necessitates keeping his store open evenings, he tendered his resignation and it became necessary to appoint a new treasurer. Mr. G. O. Snyder, Secretary of the chapter, was asked to assume the office of treasurer until the next annual election.

PITTSBURGH CHAPTER

November 10th—Due to the illness of Mr. Black, the Chairman of the Educational Committee presided over the meeting. Following the usual business session a discussion of the methods of changing Isobutane systems to SO₂ systems was conducted by Messrs. N. D. Wagener and J. Barbagallo. In making plans for the next meeting Mr. C. V. Hale was instructed to procure the Detroit Lubricator Co. film, slides and records for portraying the products manufactured by that company for the next meeting. Announcement was made that the next

meeting will be the annual election of officers, and members were asked to give some thought to their choice for the coming year. Mr. Wagener extended an invitation to members to attend a Thanksgiving party to be held in Butler on the following Friday.

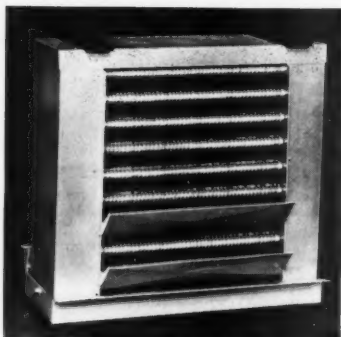
CENTRAL INDIANA CHAPTER

November 25th—The meeting of the Central Indiana Chapter held in Marion, Indiana, in the Indiana General Service Club Rooms was more of a success than was expected. The program progressed as arranged for even if Mr. and Mrs. Willis Stafford, of Aurora, Illinois, did turn their car around on the ice trying to get to the meeting on time. Each person present was served efficiently under the supervision of Mrs. Nold.

The Mayor of Marion, Mr. Carl F. Barney, gave a very fine address of welcome, including a fish tale at the end which brought a hearty laugh from everyone present.

Music was provided throughout the entire meal, after which it was found that the chapter had some excellent local talent which had never appeared before the public. This talent included Mr. William Sevy who played the harmonica in connection with the accordion and guitar.

Mr. Willis Stafford was next on the program and he acquainted the visitors and



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members with the benefits that could be derived from affiliation with the National Association, and also stated the aims and purposes of the Society. Mr. Stafford was an able, capable speaker for the National Association, and on the strength of his talk four new members were signed up right on the spot. A rousing vote of thanks was given to Mr. and Mrs. Stafford.

Next, the party was treated to a very interesting surprise in the way of sound moving pictures. A deep-sea diving and fishing picture of Clear Springs, Florida, and a picture about an automobile, without any clutch, climbing the steps of a capitol building were shown.

More music was furnished while the stage was set for a "True or False" program in which cash prizes were issued for all answers. Lots of fun and many laughs were enjoyed during this program.

LINCOLN CHAPTER

October 9th—The meeting was presided over by President Schmidt. There was a large attendance of both members and visitors present, and the usual routine of business was dispensed with in order to get on with the charter presentation which was the primary purpose of this meeting. An election of permanent officers for the coming

year took place with the following being elected: *President*, T. M. Duffield; *Vice-President*, L. B. Eiche; *Secretary-Treasurer*, J. E. Cole; *Chairman of the Educational Committee*, J. F. Wickham; *Member, Board of Directors*, Fred Wickham; *Sergeant-at-arms*, Earl Bowen.

Short talks were then given by the new officers pledging their cooperation to the chapter. Mr. Duffield, the new president, then took charge and introduced Mr. S. A. Leitner, National Treasurer, who was in attendance for the purpose of presenting the chapter with their charter. Mr. Leitner delivered the oath of allegiance which proved to be an impressive ceremony to those present. The charter was then presented to the Lincoln Chapter and accepted on behalf of the members by President Duffield. Mr. Leitner then gave some very helpful suggestions concerning the conducting of a successful chapter, and read an interesting article on the association and its aims and benefits. After some discussion it was decided that future meetings should be held on the first and third Mondays of each month.

Among those present who presented interesting remarks for the good and welfare of the chapter were Mr. Haeberlein, Mr. Ferguson, Mr. Cherry, Mr. Lewis and Mr. Doyle.

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LONG BEACH CHAPTER

November 2nd—Members met at Willis Refrigeration at 7 p.m. and drove to Los Angeles for a meeting at the Weber Showcase Co., 5700 Avalon Blvd. Twenty-two members made the trip. Engineer Pruitt took us through the plant and gave us a lecture on the material and building of showcases, fountains and frozen food boxes. Mr. Fisher and Mr. Schwonder helped Mr. Pruitt in answering our questions. Two hours were spent on the trip and when completed, the Weber Showcase Co. furnished beer and popcorn.

The regular meeting was then held with Second Vice-President Riley officiating in the absence of President Voepel.

A business discussion of a city ordinance as to license renewal by Messrs. Voorhis and Murphy was held. Mr. Brown, Chairman of the Educational Committee, then thanked the Weber Showcase Co. and Mr. Fisher for their splendid cooperation in showing their merchandise.

PHILADELPHIA CHAPTER

October 9th—An enjoyable meeting was held on this date at Jourden School, with President Grant presiding. After reading the minutes of the previous meeting and receiving the Treasurer's report, a resignation from the Sergeant-at-arms was read and

accepted, and the office declared vacant.

A Membership Committee was appointed by the Chair, consisting of Messrs. Gaspari, Callaghan, and Mr. Smith, with Mr. Gaspari as chairman.

The Educational Committee reported progress in the arrangement of future programs and the Educational Committee was asked to continue with its good work.

MISSISSIPPI VALLEY CHAPTER

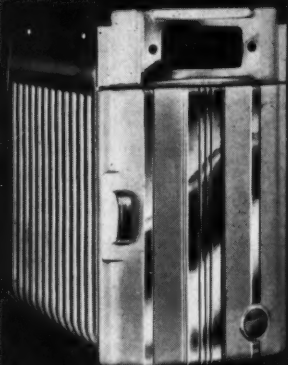
October 27th—The meeting, as usual, was held in the Republic Electric Co. building and a letter was read by Mr. Bengston regarding the General Electric unit provided by the national office for the education program of the chapters. The letter stated that this unit would be available to the chapter for its next meeting and a motion was made that the national office be notified of the chapter's acceptance of this date.

Considerable discussion took place regarding the second annual state association meeting to be held at Rockford, and some suggestions were made regarding subjects which should be discussed at this meeting. The Secretary was instructed to write Mr. Nelson informing him of the suggestions and to ask that speakers be provided to discuss the subjects.

MILE HIGH CHAPTER

November 8th—The meeting was called to

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order by J. Lind, President. An article on frozen bread was read by E. L. Huff and discussion pro and con followed. Follow-up articles were to be presented in the future if possible.

Considerable discussion was held on various refrigeration problems and reports on two refrigeration jobs were given by Ernest Martin and P. F. Redlingshafer.

It was suggested that a committee be appointed to study the possibility of having a code in Denver and the subject was to be carried over as unfinished business.

ST. LOUIS CHAPTER

October 12th—The first regular meeting of the chapter's fall and winter series was called to order at 8:30 p.m. by Secretary Plesskott.

The G.E. monitor top unit, sent from national headquarters, was taken apart and the various service operations taken up step by step in accordance with the special educational bulletin sent with it. Educational Chairman Gyax was assisted in this by some who had a little experience on these units.

He announced that for the next meeting Mr. Don Schwartz, of the Air Reduction Sales Co., would give an interesting demonstration of the amazing properties of Liquid Air. Secretary Plesskott added that this would be an open meeting and the American

Air Lines would have a representative on hand to show their film "The American Way." The ladies were also invited to be present.

October 26th—Due to the nature of this meeting all business was dispensed with and the meeting immediately turned over to representatives of the Air Reduction Sales Co. who gave a most interesting demonstration of the properties of Liquid Air. This was followed by a showing of the American Air Lines' film, "The American Way," and a brief talk by a local American Air Lines representative.

Mr. Huhn announced that Mr. Gyax was out of town, but felt certain that an interesting program was being scheduled for our next meeting, due notice of which would be sent at an early date.

November 9th—In order to give the speaker, Mr. George H. Clark, ample time to cover his subject the business portion of the meeting was dispensed with. Educational Chairman Gyax introduced Mr. Clark, our National Educational Chairman, though he really needed no introduction to his many friends in St. Louis. Mr. Clark, who at present is a designing and research engineer of the Square D Company of Detroit (who have recently added the manufacturing of a complete line of refrigeration controls), exhibited a movie showing the exhaustive tests and research going into his company's products.

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Particular stress was given the "wiping contacts" as incorporated in their line of controls. The display of controls, solenoid valves, and the new capacity booster valve was then shown and explained in detail, at the conclusion of which a sneak preview was had of the new forthcoming automatic super-heat valve, which will be explained in complete detail at our forthcoming convention.

SIoux CITY CHAPTER

October 13th—Because this meeting was called for the primary purpose of charter presentation by Mr. S. A. Leitner, all business was dispensed with and the meeting took the form of a social evening at which members of both the Sioux City Chapter and the Omaha Chapter, and their ladies, were present. The meeting was held in the Egyptian Room of the Oasis Night Club. Dinner was served at 8:45 p.m., with a choice of sizzling steaks or halibut on the menu.

After the dinner was over presentation of the charter to the Sioux City Chapter by Mr. S. A. Leitner, National Treasurer, got under way. Fourteen members received the oath of allegiance and the ceremony was both impressive and interesting to the ladies and visitors present. The program continued with informal talks by all members present, from which came many helpful suggestions regarding the conducting of a chapter. Souvenirs representing "Screwballs" were presented to everyone and Mr. Jack Doyle, in recognition of his past efforts in connection with the chapter was presented with a big gold screwball as a token of the honor of being the most esteemed and "on-ery" screwball.

Following this little ceremony the group retired to the Rotary bar where dancing continued until the early morning hours.

MOUNT ROYAL CHAPTER

October 10th—After dispensing with the business details for the evening Mr. Ross Turner was called upon to give an outline of his future educational program. He stated that at the next meeting Mr. E. A. Vigers, of the Canadian General Electric Co. would address the members. His subject would be air-conditioning in conjunction with refrigeration. Mr. Turner also made mention of the letter received from the Ontario Maple Leaf Chapter regarding a movie and educational talk on Penn Controls which would be presented to the chapter at a later date.

The meeting was then turned over to Mr. Boucher who gave some interesting information regarding cooling systems and their usages. He brought out the fact that cooled water increases the employees' health and efficiency, builds good-will and saves the company money. Cooling systems, Mr.

Boucher went on to explain, are used by bot-
tlers, bakeries, photographic laboratories,
etc., and also fulfill all requirements in of-
fices, stores, mills and factories. He gave
some interesting information regarding the
methods of installation used and figures on
operating costs.

After this, Messrs. Ross Turner and Nor-
man Caffrey entertained the members with
a quiz program. Mr. Ross was the last man
down and was declared the winner.

\$\$\$

KANSAS CITY AUXILIARY

The meeting of November 14th was called
to order by Mrs. O. R. Irwin, President.
By a unanimous vote it was agreed that the
Auxiliary adopt a needy family for Christ-
mas. Mrs. Irwin appointed Mrs. Thompson
to help her find a suitable family. Mrs.
DeWilde and Mrs. Meeker were appointed
to select the food for a basket and each
member was asked to bring canned goods to
help fill the basket. The winner of the "Bank
Night" drawing was not present; a motion
was made and seconded that the amount
(\$3.10) be set aside to spend on the family.
The president announced that she had ob-
tained Christmas cards to be sold, by the
members, at a fair profit for the Auxiliary.
Plans for a Christmas party for the Auxil-
iary members and their husbands to be held
December 26th was discussed. It was de-
cided that each one attending bring a gift
to put on the tree, thereby, each one present
would receive a gift. The entertainment
committee was instructed to make final
plans as to the place, decorations, entertain-
ment, etc.

TRI-STATE AUXILIARY

Monday night, November 6th, the meeting
of the Auxiliary was held at the home of
Mrs. M. E. Harrison, in Ashland, Kentucky.
The Secretary's report was read and ap-
proved. The ladies decided since the treas-
ury was so large they would use the money
for a turkey dinner and Christmas party to
be given December 10th.

Refreshments were served and the meet-
ing was adjourned.

The regular meeting of the Auxiliary was
held Monday night, November 20th, at the
home of Mrs. Roy McElhaney. The Secre-
tary's report was read and approved, and
plans for the turkey dinner and Christmas
party were further discussed. Each member
was asked to bring a ten-cent gift for the
"grab bag" or "passing party."

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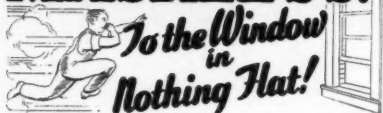
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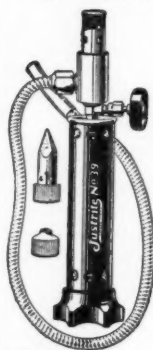
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This Halide Leak Detector accurately detects Freon-12, Carrene and other non-combustible halide refrigerant gases.

BURNS GASOLINE, BENZINE OR NAPHTHA but not alcohol. Flame can be adjusted as desired. No pump—no pressure system. Easily converted from detector to soldering iron or torch.

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COMPLETE

10 3/4" Overall
Weights 1 3/4 Lbs.
Burns 30 to 45 Min.

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2095 Southport Ave. Chicago, Ill.

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment as well as oil burners to "The Question Box."

SODA FOUNTAIN TROUBLE

QUESTION 348: We have been having considerable trouble with a soda fountain. There is no name plate on this fountain, but I understand it is a Valerius.

It is cooled by a Frigidaire low-side float coil which is situated between two of the compartments. The action of this fountain is very peculiar in that I can get this coil down to operate on 20 inches of vacuum yet cannot get the compartments below 2°.

The cabinet is full of brine. There are two valves on the right that are supposed to control the temperature in three compartments, but I cannot get them cold enough. It appears as though I am getting more than

enough refrigeration at the coil but do not get any transferred to the brine and to the compartments.

ANSWER: From the description you have given me on the Valerius soda fountain, I am inclined to believe the trouble is due to a weak brine solution. This is a situation that will very often fool the most experienced men in soda fountain work because it is so easily overlooked, and even if the top of the cabinet is taken off so you can see down into the brine it is often overlooked.

Due to its continuous use, the calcium chloride will be gradually dissipated until the solution becomes so weak that the water is separated from the brine and frozen in a layer around the coil. In doing this, an in-

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sulation blanket is set up around the coil, which prevents the conductance of heat from the brine to the coil.

The condition has probably been developing over a period of time but it has been possible to secure sufficient temperature by lowering the pressure control settings so that the machine operates on a lower temperature; however, the condition eventually gets to the point where it is no longer possible to secure the proper temperature.

To remedy the situation it will probably be necessary to allow the entire cabinet to warm up to the point where the ice will melt, pump out the old brine, and either add sufficient calcium chloride to bring it up to its proper strength or to replace the entire solution with new solution.

REFRIGERATOR GETS HOT

QUESTION 349: I will appreciate very much your discussing in your monthly publication Gibson Refrigerators, especially Model No. GH 213-48. I have had my hands full for the past three days. Experience has taught me a lot but I have never seen a case where the motor and compressor compartment registered 186° F., room temperature 86° F., cool-

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ing fan going full blast. I will appreciate more details on everything in your magazine so all of your readers may benefit from same.

What do you suggest when the condenser temperature is over 160° F., with the cooling fan going?

How much can you overcharge a low side float and still maintain its proper efficiency?

A week ago I was called in to service a commercial Frigidaire job using 10 pounds Freon (F12). After I serviced same properly I found that the box used 12 pounds of F12. Do you think that when the climate changes gas must be added for same, assuming all other things are in proper condition?

ANSWER: Full service information on the Gibson refrigerator was published in the April 1936 issue of THE REFRIGERATION SERVICE ENGINEER. I am sorry to say that all copies of this issue, however, are out and it is no longer available.

Evidently the trouble you had with this refrigerator registering such a high temperature was due to insufficient refrigerant in the system, which caused the machine to run continuously and permitted the refrigerant control to remain in a wide open position so the hot gases from the condenser passed



Start that refrigerator in a jiffy!

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AEROVOX
CORPORATION
NEW BEDFORD, MASS.
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directly into the evaporator, creating the high temperature in the refrigerator.

High condenser temperatures may be due to several things, such as dirty condenser, carbon accumulation on the inside of the condenser, overcharge of refrigerant, air in the system, or poor air circulation due to damaged fan blades. The cause, however, is more commonly due to air in the system or to an accumulation of dirt on the outside of the condenser.

The receivers on refrigerating units are usually built with sufficient capacity so that the entire charge of the system may be pumped down and held in the receiver.

For this reason we usually find a flooded type system employs a much larger receiver than the dry type system.

On the low side float system, nearly all the refrigerant is contained in the float during operation, only sufficient being contained in the receiver to maintain a liquid seal. The amount of overcharge that a low side float can stand and still maintain proper efficiency will, therefore, depend entirely upon the size of the receiver, since this overcharge will be the amount contained in the receiver over and above that which is required to maintain the liquid seal.

In most cases one might be able to add anywhere from 1 to 5 additional pounds of refrigerant to the receiver without noticing any difference in operation. The difficulty would be experienced when an attempt is made to pump the system down.

With regard to a Frigidaire commercial job using F12, it would be my opinion that if it operates satisfactorily at this time there is no reason why it should require more refrigerant in colder weather. It is true that more refrigerant will be contained in the condenser in the warm weather due to the high head pressures holding a greater amount of vapor in the condenser, but I hardly believe this amount would be sufficient to make a noticeable difference in operation.

MISCELLANEOUS QUESTIONS

QUESTION 350: In purchasing and installing expansion valves of the automatic and thermostatic type, is it possible for them sometimes to operate for a short time and then fail to operate correctly? If an automatic expansion valve, containing a ⅜-inch inlet and a ⅝-inch outlet, was removed due to improper operation and a new one installed, it being a nonadjustable thermostatic

controlled valve, with a $\frac{3}{8}$ -inch inlet and $\frac{1}{2}$ -inch outlet, would this make any difference? Both were to operate at the same pressure, or in the temperature range.

On refrigerators which use a check valve in the suction line, as on the Basting-Blessing ice cream freezers and coolers which have a check valve in the suction line to prevent the gases from entering the cooler when the freezer is in use, what trouble would develop if the check valve failed to hold? How can one tell if this valve was operating or holding tight? How would one test this for its proper function without removing the valve from the line?

What are the Sp. gravities of SO_2 , Methyl Chloride, and F12 ?

Do you know where the SO_2 test paper could be obtained? I have never seen this advertised—only the statement used in the "Official Refrigeration Service Manual."

When a compressor is shut down it has a tendency to equalize the pressure on both sides of the system and the longer it is shut down the more this takes place, especially in the simple systems, so that sometimes it is difficult for the motor to start the compressor, especially when the motor is so nearly loaded to full capacity. What I would like to know is what kind of a valve could be installed in the suction line close to the compressor to limit this so that the motor can start off easily without an overload?

ANSWER: The fact that your replacement expansion valve has a smaller outlet than the original valve should have no bearing on the operation.

Most of these valves are built with several sizes of outlets merely as a convenience in connecting the different size tubes used in the cooling coils. Nearly all of the valves are marked with the size orifice they contain and this is the only governing factor of its capacity.

If you change from an automatic expansion valve to a thermostatic expansion valve—whether of the nonadjustable or the adjustable type—there should be a noticeable improvement in operation due to the fact that thermostatic valves will operate with higher overall efficiency than automatic valves.

It is quite possible that in replacing a valve the new one will operate for a period of time and then fail. The failure, however, is seldom due to the valve itself but is more likely due to moisture in the system, or to carbon and dirt, which will clog the screen or obstruct the orifice.



"To Success!" yours and ours

¶ As we come again to the holiday season and pause to consider the past year and the next, we acknowledge our debt to the refrigeration service companies of this country, and thank them sincerely for the business they have given us.

¶ It is with a great deal of pride, too, that we realize we have played a considerable part in opening up to them a source of new and profitable business, which they might not otherwise have had.

¶ In your plans for 1940, therefore, you should seriously consider Herveen and the possibilities of servicing Frigidaire Meter-Misers. You'll find it a source of profitable additional business.

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I don't know how you can test a check valve to determine if it is leaking without removing it. However, if it leaks bad enough the trouble will show up when refrigerant will condense back in the cooler and cause a frosting on the suction line when the cooler is again placed in operation. As the trouble grows worse you may reach the point where raw liquid will be drawn into the compressor, causing oil pumping and slugging.

The specific gravity of SO_2 is 1.4 at 60° F.; Methyl chloride .95 at 50° F., and F12 —1.35 at 60° F. I take it for granted the SO_2 paper you mention is what is known as Litmus paper. This can be obtained from many of the larger drug stores or most any drug store may obtain it from a druggist supply house. It may also be obtained from your local jobber in most cases.

The trouble you describe when a compressor is shut down is probably impossible to overcome entirely unless the compressor valves are closed off at the time the system is shut down. However, there are two methods of doing a fairly satisfactory job of preventing condensation of refrigerant in the compressor during the shut down period, and which may be of help.

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The first of these is to install a solenoid valve in the suction line near the compressor which will be operated by the thermostat or pressure switch, as the case may be. It should be so connected that when the machine stops the solenoid valve would close, and vice versa.

The second method is to install a constant pressure suction line valve. These valves are primarily intended for installation in commercial multiple systems to regulate the back pressure reaching the compressor in order to avoid an overload at any time on the compressor. They can be adjusted to permit a certain amount of pressure to pass and they tend to throttle the back pressure down to this point.

While this last method would help considerably, I doubt whether it would entirely prevent the condensation of gases since a certain amount of pressure would always be permitted to pass the valve.

TWO TEMPERATURE WORK

QUESTION 351: I was recently called in on a reach-in box equipped with a Kelvinator $\frac{1}{2}$ hp. high side. When the unit was first installed an ordinary finned cooling coil was

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installed in the box, but later, on the desire of the owner, an ice chest containing eight ice cube trays was also placed in the reach-in box.

A Detroit thermostatic expansion valve was installed on the ice chest. The tubing leading from the evaporator then goes through the cooling coil and back to the compressor. The valve bulb is fastened on this coil just before it leaves the box.

The evaporator is wound with $\frac{3}{8}$ -inch tubing while the cooling coil is made up of $\frac{1}{2}$ -inch copper tubing. Is it practical to have two sizes of tubing, the smaller leading from the expansion valve?

This unit is controlled by a Ranco temperature control with the bulb clamped on to the evaporator and set to cut in at 26° F. and cut out at 14° F. The owner of the box claims it will freeze ice cubes but not ice cream in the ice chest. As the same time she desires the cooling fins to defrost on the off cycle. Is this possible with the hook-up which she has?

Would it be advisable to add an automatic expansion valve to the ice chest and allow the thermostatic valve to control the cooling coils?

ANSWER: In order to do all the things your customer wishes in the Kelvinator refrigerator I am of the opinion that you will have to make two changes. This refrigerating system will undoubtedly work satisfactorily as it was originally intended to do; however, there is too great a temperature difference required when you are endeavoring to freeze ice cream in one evaporator while having the other operate on a defrosting cycle and it is therefore not possible to obtain both these conditions on one expansion valve.

Freezing ice cream requires a temperature of zero to 5°, while to operate a coil on the defrosting cycle it should be set between the temperatures of 14 and 32°. Therefore, I would suggest the only manner of doing this job would be to tee off both your suction and liquid lines, supplying each evaporator with a separate expansion valve, liquid line and suction line and install in the suction line of the finned coil either a two-temperature snap action valve or a solenoid valve operated from the thermostat.

If the latter is used a pressure switch will have to be installed on the compressor and set for the lowest temperature required on



2ND ANNUAL ALL-INDUSTRY
REFRIGERATION AND AIR CONDITIONING EXHIBITION

BOOTH 116

THE **Electrimatic** CORP.
2100 INDIANA AVENUE CHICAGO, ILL.

the ice freezing unit. If a snap action valve is used there will be no need of the thermostat since the machine will have to be controlled by a pressure switch set as mentioned above and the snap action valve set for the temperatures required in the finned coil.

I believe this is the only satisfactory manner of producing the results the customer desires.

MARC SHANTZ TO HANDLE FEDDERS AND TECUMSEH

MARC A. SHANTZ, 112 N. Green St., Chicago, well-known Fedders representative in the refrigeration industry, has recently broadened the scope of his activities. In addition to the refrigeration products of the Fedders Mfg. Co., with whom he has been associated for the past nine years,



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he will represent the Tecumseh Products Co., manufacturers of Chieftain compressors.

The same Fedders branch policies which were established when the first Fedders branch was opened in Chicago in July 1933 will be maintained. Complete warehouse facilities of Fedders products, as in the past, will also be maintained. The basic policy to be followed in his new operation is one of close cooperation with the refrigeration parts jobber and the national policy of the manufacturer is to be adhered to.

In representing Tecumseh Products for the jobbers and manufacturers in the usual Chicago territory, he succeeds Mr. L. W. Larson, who has been promoted to assistant sales manager, with headquarters at Tecumseh, Michigan.

ROTARY SEAL TO AWARD RADIOS AT CONVENTION

ONE of the novel features at the 2nd Annual All-Industry Refrigeration and

Air Conditioning Exhibition sponsored by the Rotary Seal Company, 809 West Madison Street, Chicago, Illinois, manufacturers of the popular replacement seal for practically every requirement in the refrigeration



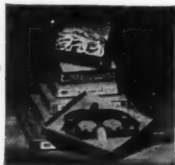
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industry, will be the award of a unique bed radio and lamp combination.

Illustrated is a picture of the new Lullaby Bed Lamp-5-tube Radio, which represents the first combination lamp and radio to be placed on the market. It is a radio of exceptionally fine tone for its small size, and

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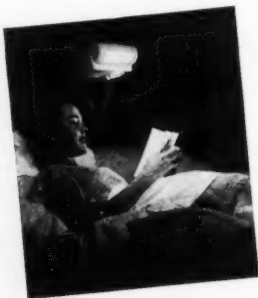
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is equipped with a powerful dynamic speaker, including a built-in "Air Magnet" which eliminates aerial or ground wires, and an automatic volume control circuit.

The other illustration shows the Lullaby Bed Lamp-Radio in use.



The Rotary Seal Company will award one of these radios at each session of the R.S.E.S. meetings. Tickets will be distributed at the registration desk and awards made at the conclusion of each session.

SPORLAN SOLENOID VALVES

THE Spoeher-Lange Company of St. Louis has recently brought out a line of solenoid valves for water and refrigerants. While these are the first solenoid valves produced under the Sporlan trademark the experience of the designers of these valves goes back to 1927. It was in that year that solenoid valves were first developed and sold under the name St. Louis Motor Valve Company. It is the intention of the Spoeher-Lange Company to develop additional types and sizes during the coming year.

At present there are four types of Sporlan solenoid valves available. The type 10 valve and the type 40 are for freon and methyl chloride liquid lines. The type 10 has a capacity of 4 tons on freon and the type 40 is rated 10 tons. The type 20 valve is for small water lines. Its capacity is about one G.P.M. The type 30 valve is for liquid ammonia lines and is rated 15 tons.

The type 10 and type 20 valves have $\frac{3}{8}$ inch F.P.T. connections. The type 40 has sweat connections for either $\frac{7}{8}$ inch or $1\frac{1}{8}$ inch OD copper tubing. The type 30 valve

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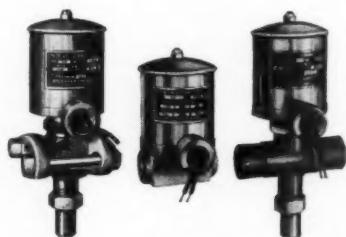
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is a flanged valve which can be used separately or with the Sporlan types CA or NA thermostatic expansion valves. A very compact assembly can be made by bolting together the XC filter, type 80 solenoid valve and either the CA or NA thermostatic expansion valve without the use of pipe nipples or flanges between the three units.



SPORLAN VALVES

Characteristic of all Sporlan products, these solenoid valves can be completely taken apart in the field for cleaning or servicing and can be reassembled easily. Possibility of refrigerant leaks has been minimized by welding rather than soldering the enclosing

tube. The coils are moisture proof, the valves open easily against rated pressures even under adverse conditions and the valves are unusually tight closing.

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In the above picture Irving Alter of the Harry Alter Co., is shown looking at the Rotary Seal policeman who has been working for him during the past season.

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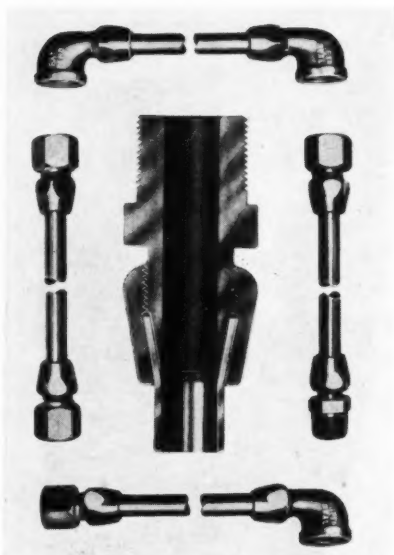
CHICAGO

SUPERSEAL CONNECTORS

A FEW of the new and widely used connectors made and sold by the Superseal Corporation, for use with aluminum, brass, copper and steel tubing, etc., are shown in Fig. 1. These Connectors are available in sizes $\frac{1}{8}$ inch to 2 inch in various adaptations and a wide range of lengths.

The particular effectiveness of this type of connector is due to the distinctive design of the Superseal couplings, employing the exclusive compression joint, sealed both inside and outside with the ends of the tubing flared to a 20-degree angle. This provides a long flare which makes certain an absolutely tight seal with the tubing wedged between the self-aligning compression nut and the fitting. The cut-away view clearly shows this long flare. Leaks or breaks are impossible.

This is an undeniable superiority over the old type coupling where the seal is made by the fitting cutting into the flared part of the tubing which has already been crystallized as a result of the conventional method of flaring. Because that cutting action greatly



THE SUPERSEAL CONNECTOR

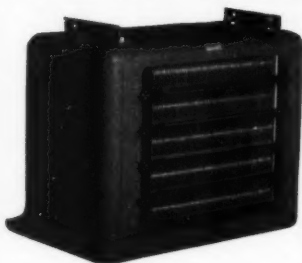
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weakens the tubing, there is the ever present danger of the tubing being sheared off by the application of the wrench or as a result of vibration.

With Superseal connectors the sealed flare can be loosened and tightened any number of times without injury to the tubing. Another Superseal feature is the full inside diameter of both tubing and fittings.

Many manufacturers of equipment have found them invaluable due to the fact that they make an absolutely tight joint, save in number of fittings required, tools required in connecting—and offer considerable flexibility in the make-up of the line.

SPRAGUE CAPACITY INDICATOR

IN addition to incorporating many unique features as a motor starting capacitor indicator, Motormike, just announced by Sprague Products Company, North Adams, Mass., serves as an emergency condenser for 110 v. 60 cycle motors where capacities from 54 mfd. to 180 mfd. are required. Motormike tells promptly and accurately what capacity should be used as a replacement on refrigerators, etc. Then, if the proper re-

placement is not immediately available, Motormike can be left in the circuit as long as necessary.

Motormike is contained in a rugged steel case, 7½ inches by 6½ inches by 6 inches, equipped with a carrying handle. Differing from many indicators which consist of nothing more than a bank of ordinary tapped capacitors, Motormike contains Sprague extra heavy-duty sections. These will take plenty of overload and can be used for continuous motor starting service if desired. Fustats give double protection. These are readily accessible through a metal flap in the front, which also contains space for extra fustats. This safety feature is particularly valuable in case an attempt is made to start a motor with a frozen bearing, or one connected to a defective compressor.

Throughout, Motormike has been designed for use by motor repair shops, refrigerator servicemen, and all others requiring a quick answer to the correct value of motor starting capacity, or an indication of other capacitor motor starting difficulty. It is an instrument which will quickly pay for itself in the savings of time and condenser costs

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Precision work by experts. Years of satisfied customers, among the largest in the country. *All work guaranteed.* TRY US and be convinced. The largest thermostatic repair service in the country. IT'S YOUR GUARANTEE. Prices on request.

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Your Jobber in Northern
Pennsylvania, Central
and Southern New York

**Ted Glou, Ray Coonradt,
Jack Glou**

Greetings of the Season GUSTAVE A. LARSON CO.

MADISON MILWAUKEE
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STATOR Rewinding

for all types of hermetically sealed units
our specialty

Complete stock of re-wound stators for G. E., Grunow, Majestic and other refrigerators for immediate replacement.

Write for prices.

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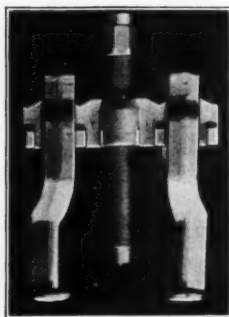


made possible. It proves particularly valuable when used in conjunction with the new Sprague Universal Motor Starting Capacitors, two types of which in a small range of capacities, will give the repairman a stock from which a large percentage of all replacements can be handled.

Motormike provides a range from 54 mfd. to 180 mfd. in six steps and is designed for use on 110 v. 60 cycle motors. The net price is \$29.90. Descriptive bulletin will gladly be sent upon request to the manufacturer.

FLY-WHEEL PULLER

A SMALL, sturdy, general-purpose puller designed for refrigerator and air-conditioning service work. Useful for fly-wheel drive pulley work, etc. Jaws can be placed



Wheel Puller Designed by Snap-on Tools Corp.

on the cross arm to meet the particular requirements of the job and can be turned to handle either outer or inner pulling operations. For further information, write Snap-on Tools Corporation, Kenosha, Wis.

Mills Condensing Units

MODERN · QUIET · EFFICIENT

See Them at the Convention in Booths 137-138

HANDY SIZE SOLDERING SET

THE Justrite "Power-Flame" soldering set is designed to do several types of soldering and other work that requires heat. The set is compact in size and can easily be carried in the tool kit.



JUSTRITE SOLDERING KIT

The set consists of a vertical type, self-generating torch and several attachments. These equip the outfit for the various types of soldering, including sweat soldering, brazing small work, dip soldering, and the familiar soldering with a heated copper.

The attachments are screwed on the end of the tube which contains the flame provided by the torch. The flame is self-generated, as the torch operates without pumps or pressure systems. The fuel used is clear, white gasoline. The torch is long and nar-

THE NEW FORSLUND 1940 CATALOG

"Unabridged Dictionary" of Refrigeration and Air Conditioning Supplies will be ready soon.

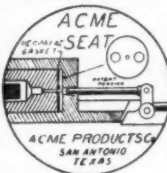
Supplies and Engineering Service Since '29.

DEALERS AND SERVICEMEN

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FORSLUND PUMP & MACHINERY CO.
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New Replacement
**FRIGIDAIRE
FLOAT VALVE
SEAT
GUARANTEED
SAVES TIME,
MONEY, HEADERS**



Ask your Jobber or send 25c for trial Seat. Thousands in use.

ACME PRODUCTS CO.
442 S. Alamo St., San Antonio, Tex.

HERMETIC REBUILDING

GENERAL ELECTRIC
MAJESTIC **COLD SPOT**
SERVEL **GIBSON**
U. S. RADIO **CROSLEY**
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Give Us Your Hermetic Troubles
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Parts, Tools and
Supplies, for Re-
frigeration and
Air Conditioning



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"WE WANT TO SERVE YOU
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ORDERS FILLED AND SHIPPED
ONE HOUR AFTER RECEIVED

WORLD'S LARGEST Hermetic Rebuilders

MAJESTIC, GRUNOW, GENERAL ELECTRIC,
COLD SPOT, SERVEL, GIBSON, AND WEST-
INGHOUSE rebuilding. World's largest re-
builders. Prices \$30.00 with 18 months' guar-
anty. Parts for Majestics and Grunows. GE
floats \$3.45. GE Streamliners \$1.50. GE Dis-
charge valves 40c. Westinghouse flappper valves
65c. 1/2 H.P. Majestic capacitor motor \$3.75.
Write for catalog. 1/2 to 3 H.P. new motors—
40% off.

**G & G GENUINE MAJESTIC REFRIGERATOR
AND RADIO PARTS SERVICE**

2429 S. Wabash - - - - - Chicago

row in shape (the length is 2 3/8 inches—the diameter about 2 1/4 inches) making it a convenient size for soldering.

Attachments available in "Power-Flame" soldering sets include copper soldering points in sizes from 3/8 inch to one inch (in both chisel and pyramid shapes), a solder ladle, a flame reducer, and an angle connection. Without attachments, the tool is used as a blow torch. Its long vertical shape permits its use in tight quarters.

"Power-Flame" soldering sets are manufactured by the Justrite Manufacturing Company, 2061 Southport Ave., Chicago, Illinois.

A-P \$250 PRIZE CONTEST

WHEN the clan begins to gather for the annual All-Industry Exhibit to be held at the Stevens Hotel in Chicago on January 15 to 18, some lucky person in the Refrigeration Industry is going to enjoy the whole show at the expense of the Automatic Products Company, of Milwaukee. According to an announcement received recently from A-P's main offices in the Wisconsin city, a cash prize of \$250 is ready and waiting for the one who submits the most appropriate name for a new filter unit developed recently by the engineers of that company. The big cash award is to be wired to the winner immediately after the judges have made their decision on the eve of January 4th.

Secure Entry Blank from Jobber

Although special mailing pieces containing entry blanks, details of the contest, and information on the new filter have already been mailed to A-P's wholesalers for distribution in the various sections throughout the country, the following information on the unit may prove helpful to those who plan to enter the contest. A-P's advertising department suggests that contestants choose names for their ability to portray or indicate the use of the product—names that are original, as well as easy to read and easy to remember.

Designed to improve valve action by removing impurities such as scale, gummy deposits, solder particles and moisture, the new A-P filter assures a smoothly-operating system at all times. Leak proof and constructed of durable materials throughout so as to comply strictly with A-P's high standards of dependability, it will last indefinitely if the proper size is used.

Recent tests conducted at the A-P plant indicate that it has many times the absorbing area and filtering capacity of other types of filter units now being used. Available in three sizes, so as to protect every expansion valve and solenoid on the system and also to insure full measure of capacity from the coil, the new product contains nothing that can dissolve or enter the system. According to the manufacturer's report, its resistance, or pressure drop, is "O" by comparison.



The New Line of A-P Filters Which Are to Be named in the Contest

The contest is open to anyone in the Refrigeration field through the wholesaler with the exception of employees of the Automatic Products Company or their advertising agency. If your local wholesaler is unable to supply information on the contest, entry blanks and bulletins can be obtained by writing direct to the Automatic Products Company, 2450 No. 32nd Street, Milwaukee, Wisconsin.

\$\$\$

HARRY ALTER CO. EXPANSION

AN announcement of great interest to all service men is that The Harry Alter Company of Chicago now is operating 12 big warehouses to enhance their already excellent service on air conditioning and refrigeration parts, supplies and equipment. Five of these branches are in the metropolitan New York area. Besides the Alter headquarters at 1728 S. Michigan Ave., Chicago,

SERVICE ENGINEER

COLTROL

**WATER & BEVERAGE
COOLERS**

**COMMERCIAL COIL and
REFRIGERATION CO.**

459 N. Artesian Ave., Chicago

**THE Refrigeration
Supply Jobbers of the
southeast - -**

ATLANTA • TAMPA
JACKSONVILLE

BOWEN

Refrigeration Supplies, Inc.

R. M. GRAVES, Pres.

Canadian Delegates!

YOUR ORIGINAL HOSTS

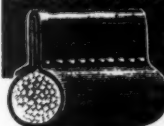
**Alex Dawson
RESCO**

**"Mac" McCracken
WAGNER**

will welcome you at the Stevens
Hotel, January 16-17th.

DENNIS GASKETS

**FOR ALL MAKES
REFRIGERATOR
DOORS**



A complete line of
rubber - coated,
packed Gaskets and
extruded rubber Gaskets that last longer
—retain higher efficiency—because made
of finest materials and workmanship.
Write for free samples, giving your job-
ber's name and address.

W. J. DENNIS & CO.
2110-20 WEST LAKE ST. CHICAGO

Classified Ads

Rate: Two Dollars for fifty words or less.
30 cents for each additional ten words or less.

LOCKER PLANT FINANCING

We will finance Locker Plants, locker plant equipment and installations. Rempe Co., 3000 Carroll Ave., Chicago, Ill.

POSITION WANTED — Air Conditioning Training Corp. and high school graduate, American, desires connection with air conditioning manufacturer as student engineer or work with air conditioning or refrigeration dealer or distributor. Will work as apprentice. Refrigeration experience one year. Tools. Go anywhere. Will call. Write John Cogley, East Brady, Penna.

BOOKS FOR SALE—Write to Nickerson & Collins Co. for a complete list of books on Air Conditioning, Refrigeration, Ice Making, Cold Storage, Food Handling, Heating, Diesel, Oil, and Steam Engines, Domestic and Small Commercial Machines, and others. These are the best books published today on Refrigeration and related subjects. Nickerson & Collins Co., 435 N. Waller Ave., Chicago, Ill.

AIR CONDITIONING SIMPLIFIED—With the Air Condition Calculator. Everyone in the industry should have one. Eliminates the psychrometric chart. See April '38 R. S. E. page 30. Postpaid \$1.50, write Nickerson & Collins Co., 435 N. Waller Ave., Chicago, Ill.



She's helping others to health! And you can too . . . if you resolve right now to mail no letter—send no package—unless it is decorated with the Christmas symbol that saves lives.

Since 1907, the annual sale of Christmas Seals has helped to support the campaign to eradicate tuberculosis in the United States.

During these years of concentrated effort, the death rate from tuberculosis has been cut three-quarters! Yet, tuberculosis still kills more people between the ages of 15 and 45 than any other disease!

No home is safe from tuberculosis until all homes are safe.

The National, State and Local Tuberculosis Associations in the United States



**BUY
CHRISTMAS
SEALS**

there are three strategically located warehouses in Chicago and one each in Detroit, Cleveland, and St. Louis. The fact that the Alter Company chose to continue their policy of expansion despite the war in Europe is just another tribute to the courage and faith of the "Alter boys."



Harry Alter Co. Branch Office at 159 So. Orange Ave., Newark, N. J., and Marty Krawczyk, Its Manager

Under the leadership and inspiration of Harry Alter, president of the company, the organization, in the course of just a few years, has taken a dominant position in the supply field. Not only do their branches serve a tremendous clientele, but their famous catalog is known more or less as a "bible" of the industry. In the export field, probably no other company is better known. They might say, with all truth, that the sun never sets on Alter equipment.

No more popular or congenial folk can be found than those "fellows down at Alter's." This includes everybody from Harry, the smiling Irving Alter, Arthur and Leo, vice-presidents, down through the entire executive personnel.

DAVIS SALES REPRESENTATIVE



A. J. DAVIS

MR. A. J. (ART) DAVIS has been recently appointed as a sales representative to the Refrigeration and Heating Supply Department of the Republic Electric Company, Davenport, Iowa.

Mr. Davis has been in the employ of the Republic Electric Company during the greater part of the last eighteen years and is a man of pleasing personality. He has been in business for himself and knows the problems of the dealer.

ROTARY SEAL ADDS 16 NEW UNITS TO 1940 LINE

SIXTEEN new replacement units have been developed by the Rotary Seal Company, bringing the total units now available

up to 130. These units provide replacements for all the most popular makes of compressors manufactured.

A new 1940 catalog sheet now being distributed to jobbers contains a complete listing of all these units. The list is conveniently arranged in alphabetical order, which makes it easy to select the unit you need.

Rotary Seal units are sold the world over. They will be on display at the Second All-Industry Exhibition at the Stevens Hotel, January 15-18. Visit Booth 153 while attending the convention and get acquainted with this new line.

\$\$\$

HASCO, INC. CATALOG

A VERY interesting catalog for the service engineer is Hasco's new 40 page catalog entitled "Let Hasco give your old parts new life." It illustrates and describes their repair charges on such items as float valves, flapper valves, water valves, controls



and evaporators. The catalog also contains new tools, cylinder heads, change-overs and compressor replacement parts for Frigidaire and Kelvinator compressors. The catalog will be mailed free upon request by addressing Hasco, Inc., Greensboro, N. C.

\$\$\$

KRAMER ISSUES BULLETIN

A NEW bulletin—No. H-240—covering their line of copper convectors has just been issued by Kramer Trenton Co., Trenton, N. J.

The bulletin provides a very compact listing of all the different size convectors made by the company together with their capacities and dimensions.

Write the company direct for your copy.

HERMETIC REBUILDING SERVICE

Serving Customers in 42 States
G.E.—Westinghouse and Majestic

¶ Our production line turns out completely rebuilt sealed units mechanically comparable to those of the manufacturer.

¶ We maintain a complete stock of all models ready for immediate shipment.

¶ Each unit carries a one-year unconditional guarantee.

¶ Place your order for desired model. C.O.D. shipment will be made same day. Return old unit later in our crate. Over-nite delivery in 400-mile radius assured.

¶ A quality product at low reasonable prices that enable you to realize profit on resale.

Write for our complete Replacement Schedule No. 42-B

WHILE ATTENDING THE JANUARY REFRIGERATION AND AIR-CONDITIONING SHOW, VISIT OUR NEARBY PLANT. YOU WILL FIND IT MOST INTERESTING AND WORTH-WHILE.

REX REFRIGERATION SERVICE, INC.

Oldest Rebuilders in the Industry

2226 S. State Street

CHICAGO

COLD CONTROLS & EXPANSION VALVES

repaired or exchanged

at the following prices, F.O.B. Chicago

Automatic Expansion Valves (All Makes).....	\$1.25
Thermostatic Expansion Valves.....	3.00
Automatic Water Valves.....	2.00
Domestic Cold Controls (Modern Type)....	2.00
Commercial Controls (Temp. or Pressure)...	2.50
Commercial Dual Controls.....	3.00

ALL WORK GUARANTEED FOR 90 DAYS

Write for quantity prices

NEW DUTY

2424 Irving Park Blvd., CHICAGO

REFRIGERATION PARTS

SEALS

Canada

UNITS

VALVES

**FASTEST
GROWING
PARTS CO.**

CONTROLS

SERVING CANADIAN SERVICEMEN TODAY

AIRCO REFRIGERATION PARTS

706 Aqueduct St., Montreal, Quebec, Canada

Index to Advertisements

Acme Products Company.....	89
Aerovox Corporation.....	78
Airco Refrigeration Parts.....	93
Airo Supply Company.....	81
Alco Valve Company.....	12
Alter Company, The Harry.....	94
Aluminum Ore Company.....	95
Ansul Chemical Company.....	65
Automatic Heating & Cooling Supply Co.....	86
Automatic Products Company.....	8
Berdor Electric Company.....	88
Blythe Company, H. W.....	90
Bonney Forge & Tool Works.....	Back Cover
Bowen Refrigeration Supplies, Inc.....	91
Bush Manufacturing Company, The.....	82
Central Service Supply Company.....	88
Channon Company, H.....	85
Chicago Eye Shield Company.....	76
Chicago Hermetic Rebuilders.....	89
Chicago-Wilcox Manufacturing Co.....	83
Commercial Coil & Refrigeration Co.....	91
Cornell-Dubilier Electric Corp.....	11
Deissler Machine Company.....	66
Dennis & Company, W. J.....	91
Detroit Lubricator Company.....	16
Electromatic Corporation, The.....	82
Fedders Manufacturing Company.....	48 and
Flushing Refrigeration Company.....	86
Forslund Pump & Machinery Company.....	89
G & G Genuine Majestic Parts Service.....	90
General Controls Company.....	80
Gilmer Company, L. H.....	74
Goldberg Company, Herman.....	90
Hasco, Inc.....	61
Henry Valve Company.....	Inside Back Cover
Highside Chemicals Company.....	62

Imperial Brass Manufacturing Co.....	9
Jarrow Products Corporation.....	88
Justrite Manufacturing Co.....	76 and 81
Kelvinator Division—Nash-Kelvinator Corp.....	73
Kerotest Manufacturing Company.....	52 and 53
Larkin Coils, Inc.....	84
Larson Co., Gustave A.....	88
Lowry Manufacturing Co.....	80
Manufacturers Fin Coil Company.....	71
Marsh Corporation, Jas. P.....	68
McIntire Connector Company.....	58
Miller Rubber Company, Inc.....	69
Mills Novelty Company.....	89
Modern Equipment Corporation.....	59
Modern Gas Company.....	79
Mueller Brass Company.....	10
New Duty.....	93
Noll Company, H. C.....	90
Peerless of America, Inc.....	51
Pittsberg Chemical Co.....	72
Practical Instrument Company.....	77
Ranco, Inc.....	14
R & H Chemicals Company.....	67
Refrigeration Economics Company.....	63
Refrigeration Service, Inc.....	85
Refrigeration Supplies Company, Ltd.....	91
Rempe Company.....	87
Rex Refrigeration Service, Inc.....	93
Rotary Seal Company.....	Inside Cover and 1
Service Parts Company.....	70
Shank Company, Cyrus.....	87
Snap-On Tools Corporation.....	60
Spiegel Corporation, G. B.....	77
Sprague Products Company.....	13
Square D Company.....	7
Superior Valve & Fittings Company.....	83
Tecumseh Products Company.....	55
United Repair Company, Inc.....	88
Utilities Engineering Institute.....	84
Virginia Smelting Company.....	75
Weatherhead Company, The.....	57


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TO SERVE YOU
MORE QUICKLY

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CONVENIENTLY LOCATED
WAREHOUSES

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 We put on speed
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THE HARRY ALTER CO.

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NEW YORK
BROOKLYN
BRONX
JAMAICA

NEWARK
DETROIT
CLEVELAND
ST. LOUIS

THIS stops trouble!

Use Activated Alumina to get results

If you want to be sure of results, be sure there is Activated Alumina in the dehydrator you use. Drying agents differ in efficiency. Activated Alumina is a drying agent which thoroughly removes moisture in minimum time.

And Activated Alumina gives you extra advantages. It can be used with any refrigerant. It removes acid present in the refrigerant, thus preventing further dilution, decomposition, and corrosion. It cannot soften, swell, or dissolve.

Dehydrators and replacement parts designed for Activated Alumina can be had from your jobber. For dependable results, remember to ask for "Activated Alumina." ALUMINUM ORE COMPANY. (Sales Agent: ALUMINUM COMPANY OF AMERICA, 2159 Gulf Building, Pittsburgh, Penna.)

ARE YOU GOING TO CHICAGO?

BE sure to see us at the Refrigeration and Air-Conditioning Exhibit, January 15th-18th.

In Booth 67-68
you'll find specific answers to all your questions about Alorco Activated Alumina.



ACTIVATED ALUMINA

CURES CLOGGED REFRIGERATOR VALVES

Here's a service man who has used the H.B.P. Calculator

• Now that the Calculator is being put to the test of practical use in the field, we have had a number of letters from service men testifying to its value. The one at the right, from Fred Hartman of Albert, West Virginia is typical

Before I proceed with my questions I wish to say a few words about the Head-Back Pressure Chart I ordered from you. I find that when the temperatures and pressure are set correctly, it will give the proper head pressure and if a compressor is set to operate according to the head pressure derived from the chart the outfit will operate correctly if the trouble has been cured. I have tested this for about four weeks and would not be without one when I do my service work. It is the best out so far.

Fred Hartman

The purpose of the Head-Back Pressure Calculator is to quickly determine the proper head pressure, for the following refrigerants when the suction pressure, room temperature or mean water temperature is known.

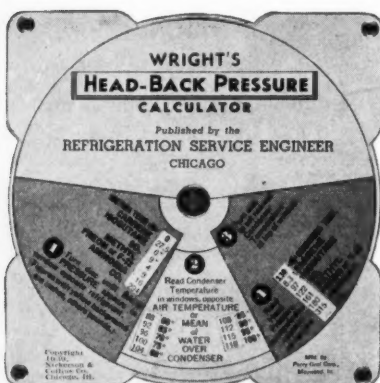
Carrene	Methyl
Isobutane	Freon or F-12
Sulphur Dioxide	Ammonia
Carbon Dioxide	

A Vestpocket Tool Every Service Man Should Carry

A number of troubles can be detected by comparison of the existing head pressure and what the head pressure should be, but in the past there has been no convenient method available to the service engineer to determine what the correct head pressure should be. Such variable conditions as the suction pressure, room temperature, water inlet and outlet temperature, kind of gas used, etc., all determine the proper head pressure. It is not practical to depend on one's memory of other similar conditions or to just use snap judgment when this handy calculator gives you the correct answer so easily. Send for it today! Sturdily constructed, with oil-proof finish, for on-the-job use.

POSTPAID \$1.00

NICKERSON & COLLINS CO.
435 N. WALLER AVE., CHICAGO



Actual Size 3 1/2" x 3 1/2".

HENRY'S HUNTING SONG

(To the tune of "THE MAN
ON THE FLYING
TRAPEZE")



If when hunting for orders,
More sales you'd complete,
Go gunning with Henry
And you can't be beat!
Henry leads in design
And is priced to compete,
And insures you more
Profit each day.

ooohhhHHH . . .

You'll increase your sales
With the greatest of ease,
Your trade—with these products—
You're certain to please,
They'll sing forth your praises
with "Oh!"s, "Ah!"s and
"Gee!"s,
It's a cinch to bag orders that way.



HENRY VALVE COMPANY

1001-19 NO. SPAULDING AVENUE, CHICAGO, ILLINOIS

*Most Complete Line of Refrigerant Valves, Dehydrators and Strainers—Also Valves
and Forged Steel Fittings for Ammonia and High Pressure Industrial Requirements*

The Finest that Money Can Buy For Refrigeration Service



THE Bonney Line includes sockets with detachable handles; box, open end, combination and flare nut wrenches; pliers; chisels; punches; screw drivers; hack saws; files; flaring and pinch off tools; tube cutters; tube benders; hammers; special wrenches and tools designed especially for refrigeration service. Stocked by leading jobbers everywhere. Bonney Forge & Tool Works, Allentown, Pa.

See the complete Bonney Line in Booth 90 at the All-Industry Show in Chicago, January 15th to 18th inc.

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